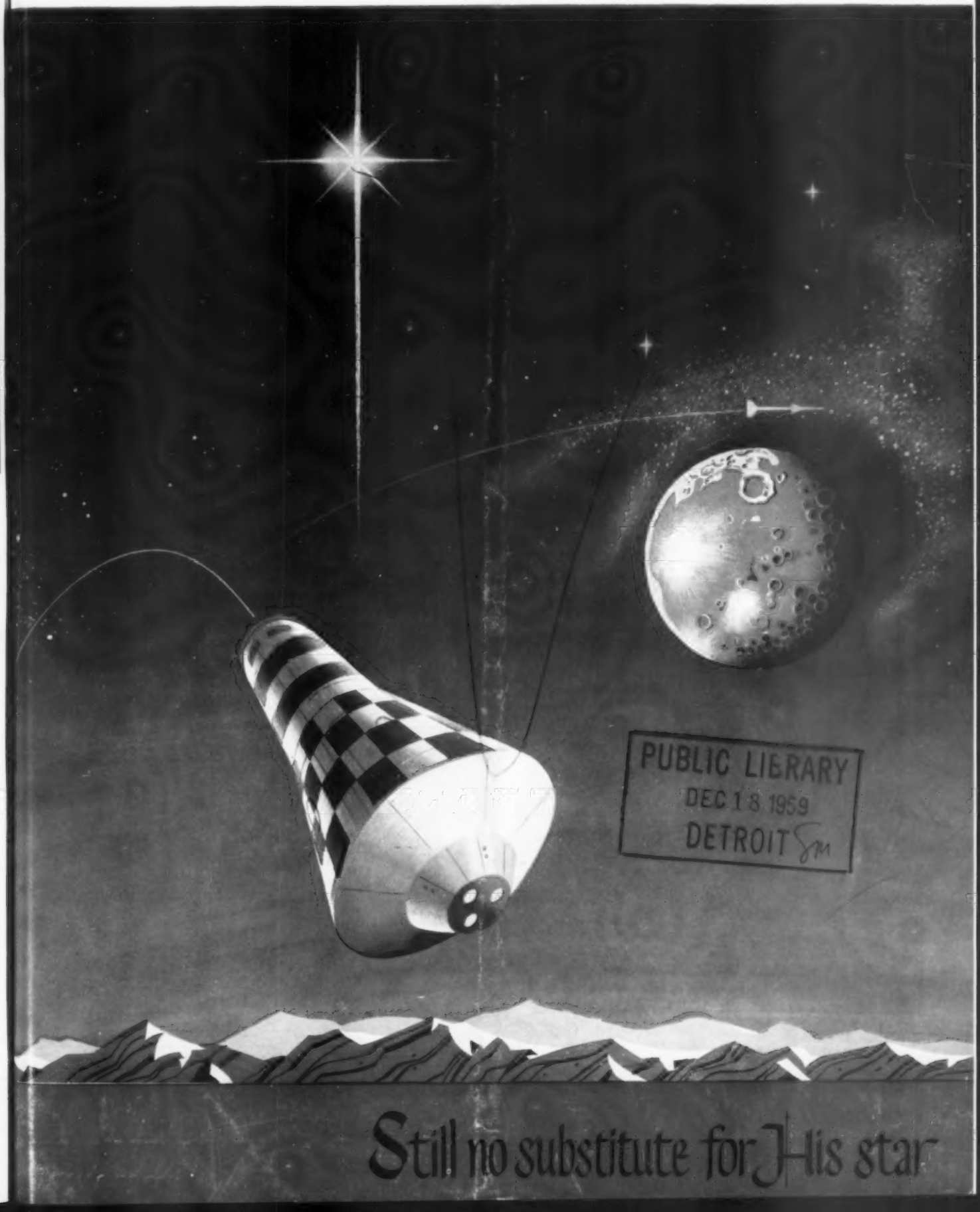
DECEMBER · 1959

TECHNOLOGY DEPARTMENT

GRINDING and FINISHING

A HITCHCOCK PUBLICATION



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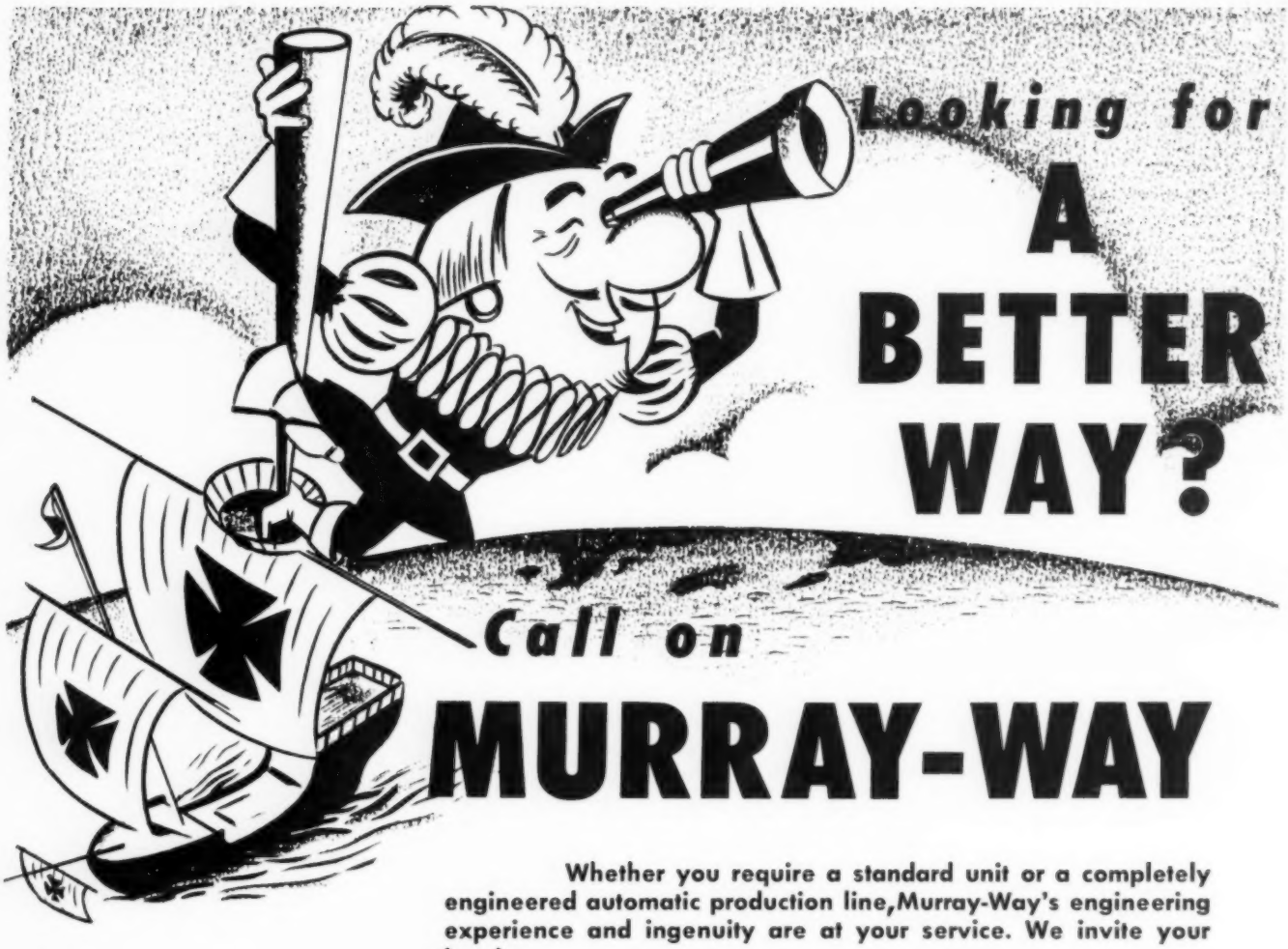

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WHEREVER ABRASIVE OPERATIONS ARE PERFORMED

GRINDING and FINISHING

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DECEMBER COVER: With practically every week bringing new headlines of some new foray into outer space, we tend to become more and more involved in the tensions of our unsettled times, graphically depicted on the cover. At such a time, it is encouraging to turn our thoughts back nearly twenty centuries, to an earlier but in its own way an equally unsettled time, when the Star shone over Bethlehem.

Subscription rates: $6.00 per year in U.S.A. $7.50 per year elsewhere.
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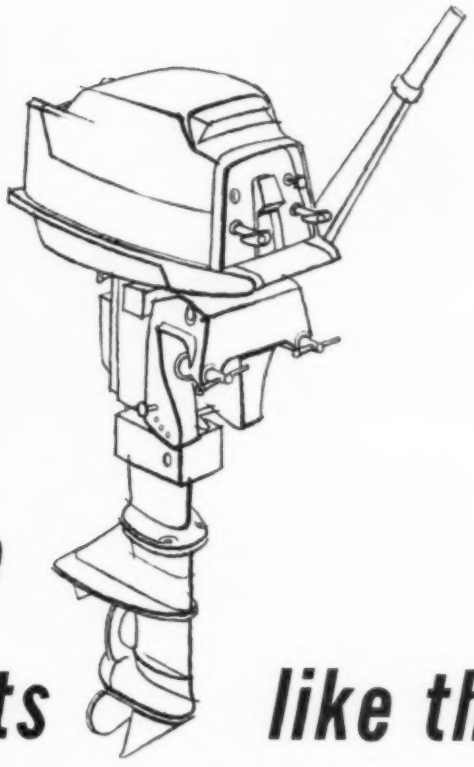
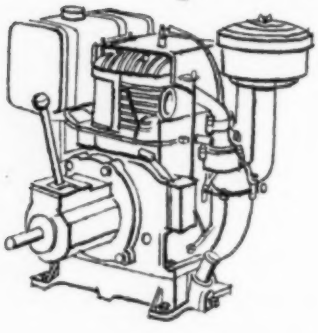
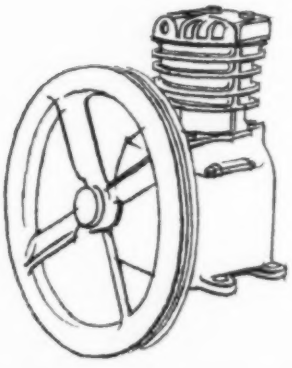
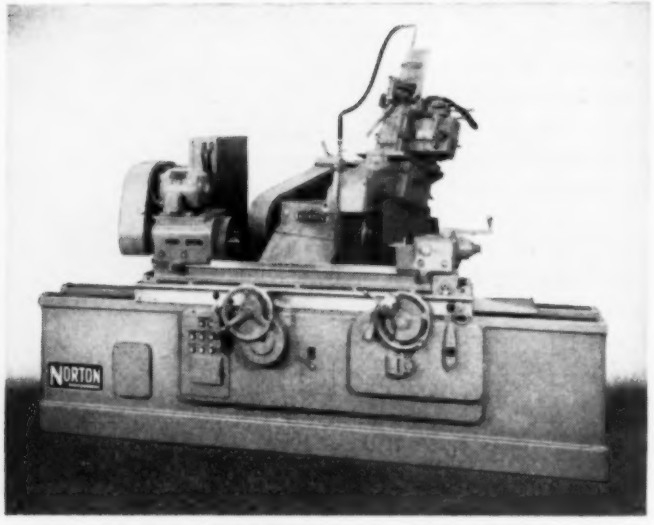
Phone MOntrose 5-1000. Cable address: HITCHPUB Accepted as controlled circulation publication at Pontiac, Illinois.



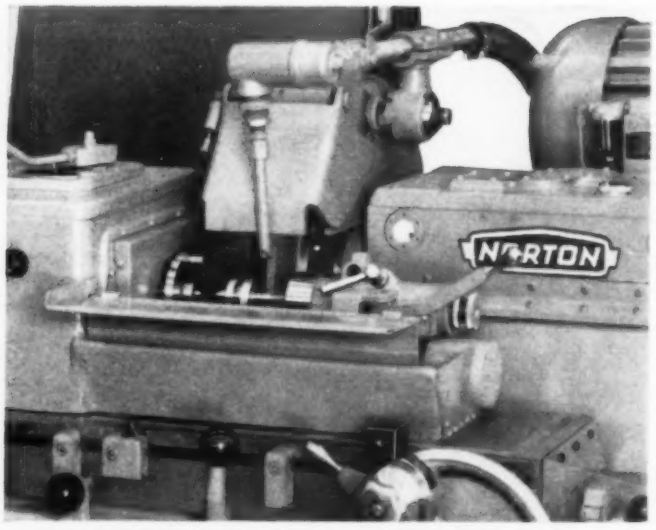
If you make products like these....





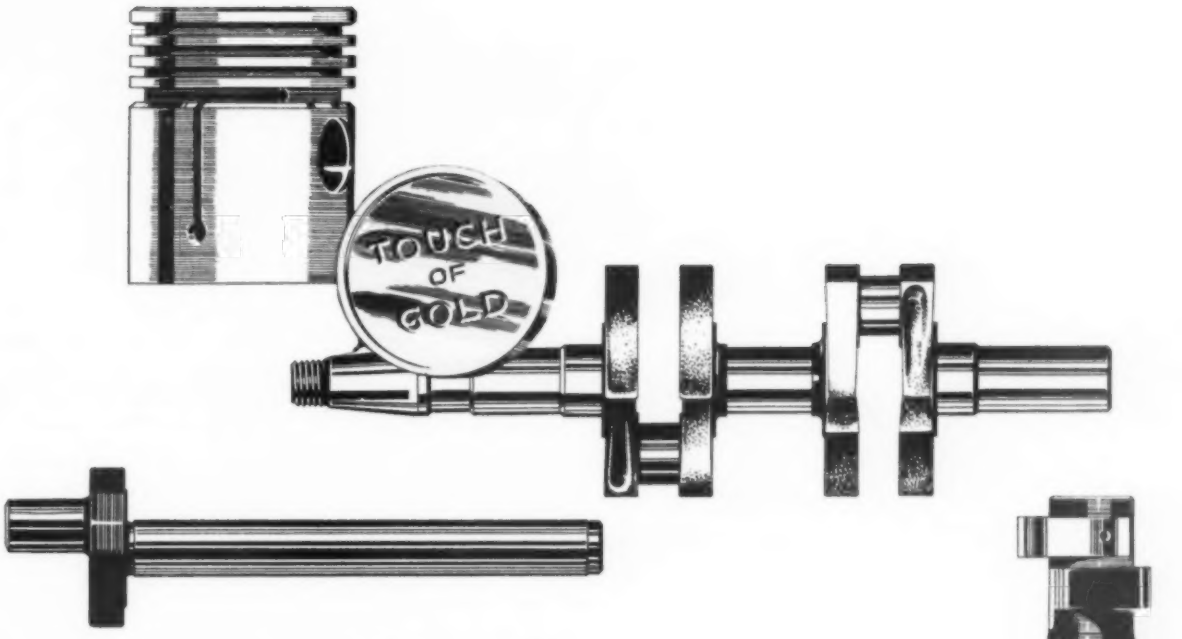


A Norton Type CV-4 Angular Wheelslide Grinder, 10″ semiautomatic, grinds the bearing diameters and adjacent shoulders of the outboard engine crankshaft shown above. Two other Norton machines are used in grinding this part: a 10″ Type LCTU for the center main bearing and a 10″ Type CTU CRANK-O-MATIC* crankpin grinder for the throws.

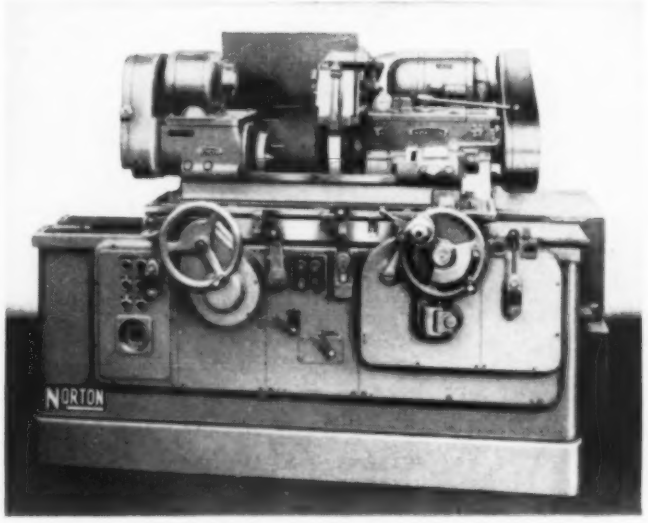


A Norton CAM-O-UNIT* Mechanism attached to a Norton Type CTU cylindrical grinder. This smooth-working grinding team broadens the scope of a proved cylindrical grinder, assuring excellent, low-cost grinding of the small piston and the motorcycle camshaft shown, as well as other special shapes.

*Trade-Mark Reg. U.S. Pat. Off. and Foreign Countries



.. grind parts like these... on NORTON machines



A Norton Type CTU Cylindrical Grinder, 6" x 18" semiautomatic, with live spindle headstock, is used for grinding the household refrigerator compressor shaft, shown above. Areas ground are the short off-set diameter, the shoulder and part of the shaft — typical of the Type CTU's ability to perform several grinding operations at one time.

The longer it takes you to grind parts for popular, mass-produced products, the more it costs you. If your grinding machines are below par, so are your profits.

Norton grinders can help you cut production time and costs to the very lowest. You have plenty to choose from — cylindrical, angular, crankpin and other grinder types, together with CAM-O-UNIT mechanisms that enable CTU machines to grind cams and special shapes with precision accuracy.

Norton grinders — all of them — are engineered for fast, accurate, easy operation, simplified maintenance and long, trouble-free service life. By combining several grinds in one job, a single Norton machine for your production can easily replace two or more ordinary grinders.

Your Norton Man, an expert grinding engineer, is always ready to help you select the grinding equipment you need to improve product quality and build your profits. NORTON COMPANY, Machine Division, Worcester 6, Mass. District Offices: Worcester, Hartford, Cleveland, Chicago, Detroit. *In Canada:* J. H. Ryder Machinery Co., Ltd., Toronto 5.

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. . . if finishing costs are eating up your profits and you can't find help, let United States Diamond Wheel Co. show you how on-the-job "PROGRESSIVE SPECIFICATIONS" has saved others. PRESSURELOK® builds optimum performance into every diamond wheel—yet your carbide cutting costs may be reduced by using different type, size, grit or hardness of wheel from the one which you are now using. Here's how we can warrantee you top carbide cutting efficiency.

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Editor's Mail

Vibration Finishing

The story on Vibratron at Woodward Governor Company seems to me to reflect favorably toward both Woodward and Vibratron. I believe the story is accurate with this exception—the castings referred to in the caption under the picture in the upper right hand corner on page 45 are not cast iron, they are aluminum. They are the aluminum columns mentioned in the first column, fourth paragraph on page 45.

Although this is a minor thing, I thought you would like to know.

Fred G. Crawford
Mgr., Publications Dept.
Woodward Governor Co.

Our regrets to Woodward and to Roto-Finish Co., makers of the equipment. For the record, however, the process would have been equally effective on cast iron, given proper media and compounds.

Ford Falcon

Your article, "How Ford Grinds and Hones Falcon Engines," which appeared in the October issue afforded excellent coverage. However, may we clarify some of the tolerances being held in the honing of the connecting rods and cylinder block bores.

Both the wristpin and crank pin bores of the connecting rods are honed to .0002" tolerances for taper and out-of-roundness, rather than the stated .0004".

With reference to the block bores, the honing operation is holding diameters within .0003" tolerance. Your figure of .0024" is due to the fact that there are 8 piston sizes of .0003" tolerance each. Block and piston are selectively fitted. Honing of the block bores is controlled to suit the run of pistons.

Also, although a .001" reverse taper is allowed over the full length of the bore, it must be a straight line taper and cannot exceed .0003" per inch.

Overall, we thought you did a fine job.

Joseph Ellis
Micromatic Hone Corp.
Detroit, Mich.

We have checked your corrections with personnel at Ford's Lima Engine Plant and find that we have made an error of omission. The blueprint tolerance for the taper and out-of-round of the connecting rods is .0004", but production is held to .0002".

The correction in our figures on the block bores is also true. Here again our figures were from the blueprint which showed an overall tolerance for the bores of .0024", but the actual honing is held to .0003" within the total tolerance depending on the size of the pistons being run.

Our article stated that a .001" reverse taper is allowed over the full length of the bore. This bore is a little more than 3" in length and therefore should imply an .0003" per inch tolerance.

What Price Imports?

The above title in a recent news release caught the editor's eye. Hence, while it may be a little outside our coverage, it is worth mentioning.

The release concerns an article from "The Educational Focus," a Bausch & Lomb publication. The underlying idea of the article is that the "price" which Americans pay for foreign imports far exceeds the dollar-and-cents value of the product purchased. The original story was based on a letter to a school administrator who inquired about the relative merits of purchasing American- or foreign-made products.

Pertinent reference is made to the price that America may eventually be forced to pay in terms of economic and even military consequences, if its citizens support the industries of Europe and Asia at the expense of those in this country.

The article points out that American industry welcomes and even thrives on fair competition, but that competition with wage rates as low as 20 cents per hour makes fair standards of comparison impossible. It is this situation which poses the real threat to national and world security.

A 3M Case History Report

DEBURRING-POLISHING TIME CUT 40% WITH "PG" WHEELS

MANUFACTURER: LeTourneau-Westinghouse Company

ADDRESS: Peoria, Illinois

PRODUCT MANUFACTURED: Earth Moving Equipment

3M ABRASIVE USED: "PG" Wheels

HOW 3M ABRASIVES ARE USED: "PG" Wheels used for contour polishing of air brake backing plate. Malleable cast-iron plate requires super-smooth finish on two concentric rings, to provide air-tight seal against neoprene air diaphragm.

OPERATIONAL DATA ON 3M METHOD: Two 1" x 10" "PG" Wheels, Grit #150 Three-M-ite Resinbond Cloth, mounted side-by-side on shop-made polishing shaft uniformly deburr and polish plate ring surfaces in 2-3 minutes.

OPERATIONAL DATA ON PREVIOUS METHOD: Overall deburring and polishing was by hand-rubbing with emery cloth. Time required was 4-6 minutes per plate.

PROVEN ADVANTAGES OF 3M METHOD: "PG" Wheel method, as opposed to hand finishing, allows more uniform finishing as abrading pressure can be more constantly applied with machine. Average time saving of 40% realized.

WANT MORE INFORMATION? Send for free manual, "Modern metal finishing with 3M 'PG' Wheels." Write to 3M Co., St. Paul 6, Minn., Dept. AAH-129.

"PG" Wheels are manufactured in U.S.A. by 3M Company, St. Paul 6, Minn. Export: 99 Park Avenue, New York. Canada: London, Ontario

WE RECOMMEND
How to use coated abrasives to cut costs, improve production, shown in the new 426 page book
COATED ABRASIVES
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3M Coated Abrasives

"PG" WHEELS

MINNESOTA MINING AND MANUFACTURING COMPANY

...WHERE RESEARCH IS THE KEY TO TOMORROW

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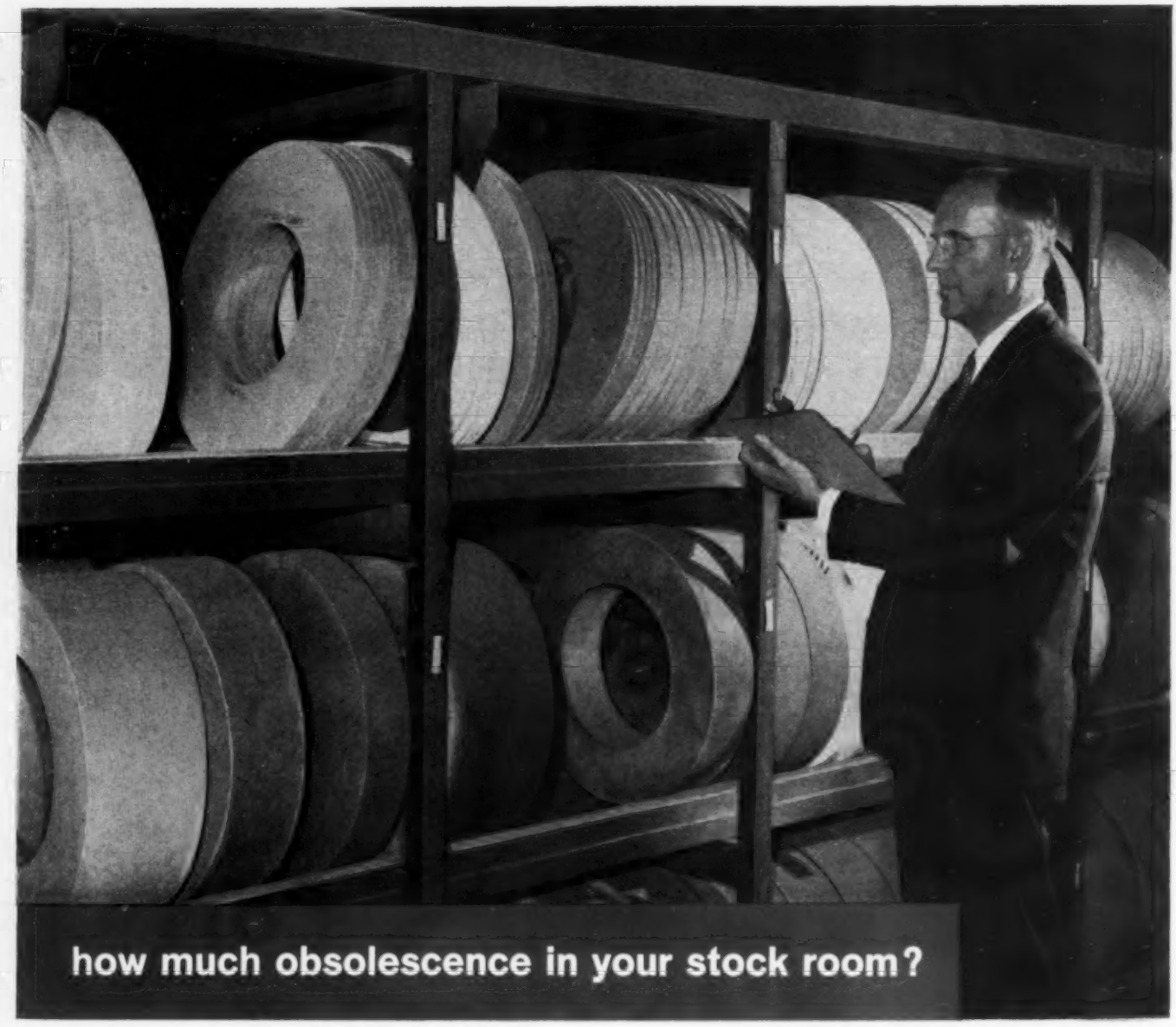

Take a close look at your wheel inventory. How much stock are you carrying in special sizes and gradings? Then ask yourself what will happen to these "specials" if the grinding applications change as they frequently do. In most cases, they're stored... to collect dust and use up valuable storage space. This is an unnecessary waste and a sure way to eat up your profits.

Wheel obsolescence can by lessened considerably with Carborundum's new line of NATIONAL STANDARDS. This basic line enables you to get maximum and universal usage from each wheel—regardless of the grinding application. Review your inventory today and sharpen your profit margin tomorrow... with NATIONAL STANDARDS by Carborundum.

For a quick solution to your conversion from costly "specials" to practical "standards", call your local Carborundum distributor. On your next order...

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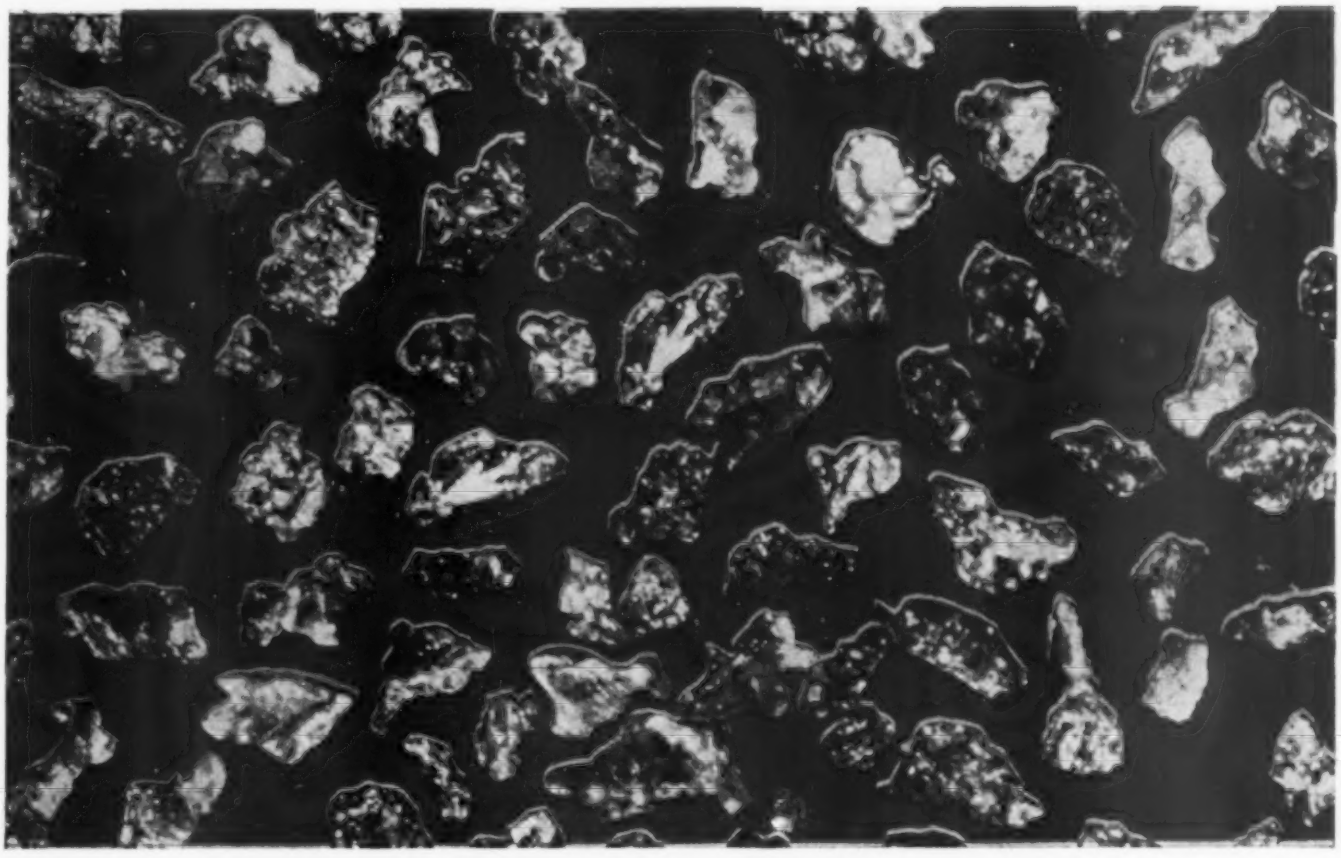

How G-E Man-Made Diamonds perform where it counts: in the plant

Grinding wheel users report on actual production results with Man-Made diamonds. Findings: substantial savings in every case!

General Electric Man-Made industrial diamonds—through actual customer "in-plant" comparisons are saving thousands of dollars in diamond grinding wheels. Here's proof:

A saw manufacturer using 3¾" x 1½" x 1¼" flaring cup wheels to sharpen carbide saws. Wet grinding with 120 grit, 100 concentration, resinoid bonded wheels. The natural diamond wheel removed only 9 cubic inches of carbide. The G-E Man-Made diamond wheel removed 34.8 cubic inches of carbide—a superiority of Man-Made over natural of 290%!

An automobile manufacturer's results on tool and cutter sharpening with 5" x 1¾" x 1¼" flaring cup wheels. Dry grinding with 100 grit, 100 concentration, resinoid bonded wheels. The natural diamond wheel sharpened 696 cutters. The Man-Made diamond wheel sharpened 1217 cutters *and still had one-third of the wheel left*—a measured superiority of 162% in favor of G-E Man-Made industrial diamonds.

A carbide manufacturer using 16" x 2" x 12" wheels for cylindrical grinding. Wet grinding with 120 grit, 100 concentration, vitrified bonded wheels. Natural diamond wheel removed 928 cubic inches of carbide . . . Man-Made diamond wheel removed 1510 cubic inches. G-E Man-Made diamond superiority of 63%!

These examples, with results typical of those found in many other applications, emphasize the superiority of General Electric Man-Made industrial diamonds. Regardless of the wheel type, G-E Man-Made diamonds are saving diamond wheel users valuable production dollars today because wheels using Man-Made diamonds last longer. Specify G-E Man-Made diamonds when you order diamond wheels and prove in your own plant the savings possible on grinding and cutting costs.

Want more information? Write: *Metallurgical Products Department of General Electric Company, 11177 E. 8 Mile Street, Detroit 32, Michigan.*

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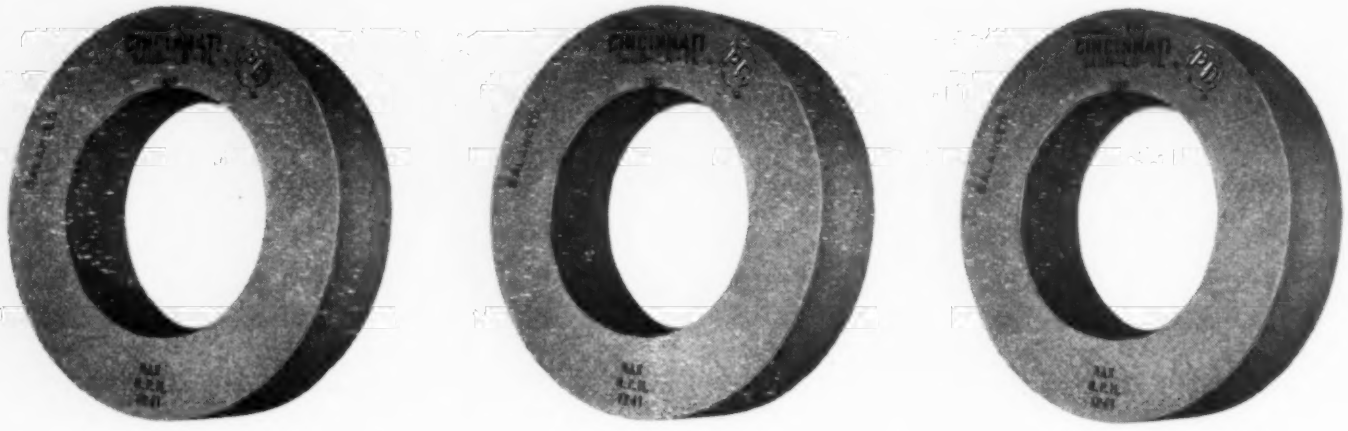
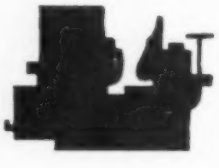


(PD) ° Distinctive bullet markings occur every time a bullet leaves the same gun barrel. The barrel rifling grooves the slug, making possible *positive identification*—an important contribution to the science of ballistics.

WHEELS MATCHED TO MACHINE

Just as a bullet is matched to a gun barrel, so CINCINNATI (PD) CENTERLESS WHEELS (like those shown above) are matched to your centerless grinding jobs. Thirty-five years of centerless grinding experience back up each application of CINCINNATI (PD) WHEELS to your operation.



PRECISION PERFORMANCE

And every time—time after time—when you reorder a CINCINNATI (PD) WHEEL, it will act and grind exactly like the original. The Positive Duplication of wheel grades by the remarkable (PD) manufacturing process *will help maintain your production*—and save you both time and money.

Whatever CINCINNATI (PD) WHEEL you specify . . . centertype, centerless, internal, surface, toolroom, or snagging wheel . . . you get Positive Duplication—every time!

APPLICATION BY SPECIALISTS

Here's another advantage for you. Each one of our factory representatives is a highly trained and experienced specialist in grinding machine set-ups and operations. For his help on those extra-tough grinding problems, call your CINCINNATI (PD) GRINDING WHEEL distributor, or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

(PD) POSITIVE DUPLICATION

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GRINDING WHEELS

° Trade Mark Reg. U. S. Pat. Off.

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METALITE 101 Discs and Belts come with "built-in zip" to speed production

Here is the perfect disc for roughing or cutting down projections such as weld beads. TYPE 101 METALITE FIBRE Discs run cool — giving fantastic mileage.

Want to lick high finishing costs? . . . try the new TYPE 101 RESINALL METALITE Cloth Belts for uniform grinding and faster finishing. Ask your BEHR-MANNING representative for a free demonstration . . . or write for information to Dept. IA-10.

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Editor's Page

DECEMBER 1959

Still no substitute for His star

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Every calendar and every dateline proclaim that 1959 years ago Christ was born. The message that night was, "Peace on earth and good will toward men."

For almost two thousand years men have sought to develop a formula for peace. But greed for power and total conquest have defeated their efforts. The wreckage of the last quarter century shows that great advances in sciences have only increased the havoc.

In 1959 we see nations seeking to gain superiority through atomic weapons, missiles and scientific achievement. Claims are being made for outer space. But He whose star shone that eventful night is still the ruler of the universe.

We believe that Jesus Christ came to this earth bringing and proclaiming—not a new religion or a revised religion—but a way of life. A way of life that brings peace and joy and happiness to each one who follows it. For the peace proclaimed by the angels is peace for the individual. It was not a promise to all mankind that wars would cease. The promised peace is only for those who accept this Babe of Bethlehem as the Son of God, and follow His way of life.

And His way is a life of service. It begins with understanding this command: "Thou shalt love the Lord thy God with all thy heart, and with all thy soul, and with all thy mind . . . and thy neighbor as thyself." (Matthew 22:37)

The answer to the great problem of today is not in war or demonstrations of power, but in using our scientific advancements for the betterment of mankind. Ours is the responsibility in everyday living to carry on for a better world by keeping Christ's principles.

The history of the world has been one of hate, greed, jealousy, envy and a desire to be first. Unless we are willing to have the spirit of Christ in our hearts, there is small likelihood that the future will be very different.

At the birth of Christ, light was given which no darkness can extinguish, nor scientific accomplishments dim. Let us walk in that light. It will then be a truly Merry Christmas and a blessed and prosperous 1960.

Robert C. Van Kampen

President
Hitchcock Publishing Company

At Raytheon Mfg. Co. . . .

Grinding non-ferrous materials to fine tolerances!

This leading manufacturer of electronic systems uses new hard ceramics as microwave system components. These extremely tough materials presented a difficult grinding problem. It was solved by using diamond abrasive wheels on Blanchard No. 11 grinders. The results were outstanding: Disks measuring approximately 2¼" x ¼" were ground to a tolerance of ±.001", with ⅛" of material removed. Flatness is .002", parallelism .002". These parts are ground at the rate of 48 per hour, and surface finish is consistently excellent.

Write for your copy of "Work Done on the Blanchard".
THE BLANCHARD MACHINE COMPANY
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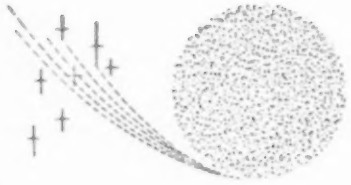


Ideas from the Shop

TRUING BLOCK FOR A STEPPED FORM GRINDING WHEEL

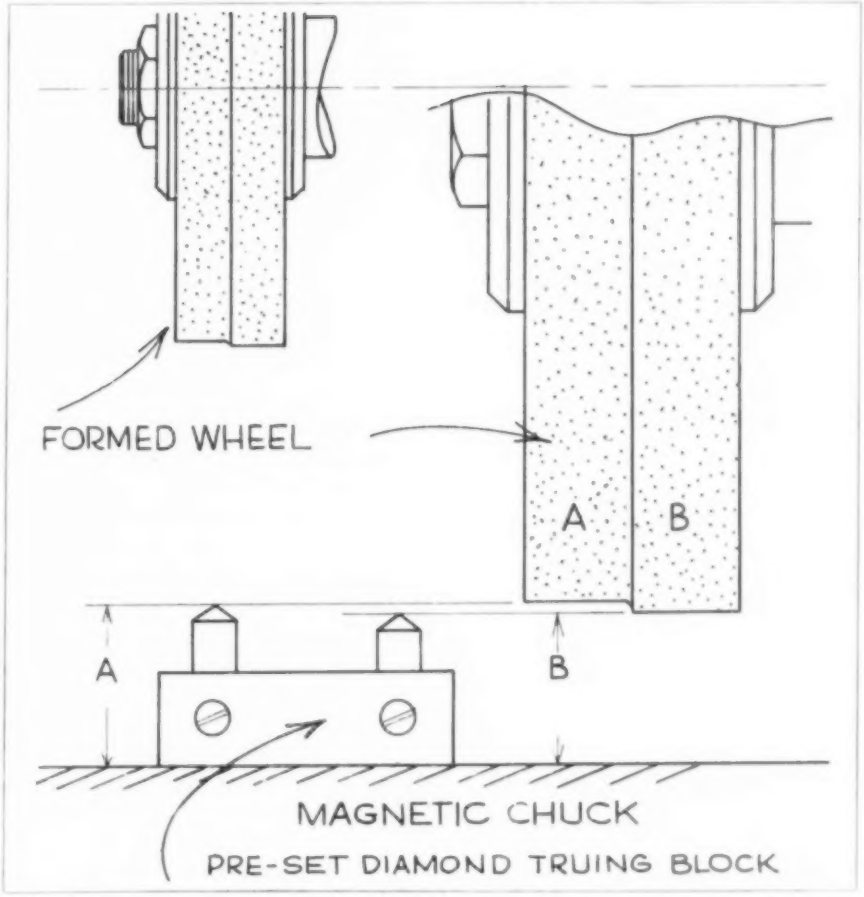
By H. J. Gerber

• In our shop we have used the illustrated method for diamond truing a simple step form on the periphery of a grinding wheel used on the surface grinder. For a production job requiring frequent re-truing to a precision step height the method will save time.

Two truing diamonds are mounted in a small steel block, as shown. They are spaced apart a slightly greater distance than the total width of the wheel in order that only one diamond is in contact at one time. Difference in height between the two diamonds governs the step height on the wheel and this distance can easily be set by micrometer measurement between each diamond and the bottom of the block before the block is set up on the magnetic chuck.

The leading diamond (B) is run completely across the face of the wheel. At the first sign of contact between the wheel and the second diamond (A) a reading is taken on the micrometer dial of the cross feed. This second diamond is then fed inward the required amount for proper width of the step.

When a wheel is to be trued many times during the course of a day's work the time spent to make up this simple device will be amply repaid.

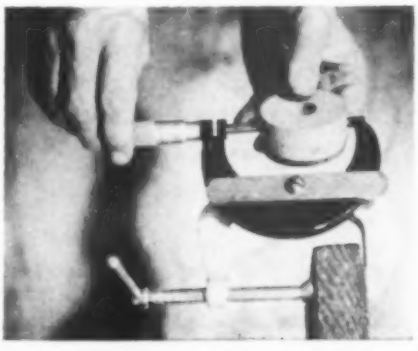


Micrometer Holder

By A. R. Tanner, Jr.

• Users of micrometers and precision measuring instruments will remember many times when they had need for a third hand. This "third hand" makes the measuring job smoother and more accurate because it holds the micrometer, leaving the hands free to correctly hold the piece to be measured and make adjustments on the micrometer scale.

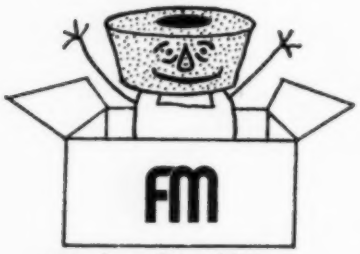
I use as my "third hand" a large 4" wide throat C-clamp and a bar of $\frac{1}{8}$" x 1" flat steel 6" long. A $\frac{1}{4}$" clearance hole is drilled in the center of the C-clamp throat and the bar to take the stove bolt. The micrometer is placed between the C-clamp and the bar and held in position by tightening the wing nut. Now the C-clamp may be fastened in any spot where good measuring conditions will exist.



"Third hand" for holding micrometer or similar precision instrument.

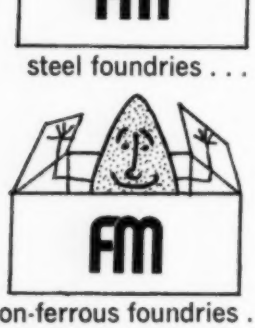
THE FM
PORTABLE GRINDING TEAM
IS READY TO GO...

to welding shops . . .



gray iron foundries . . .

steel foundries . . .



non-ferrous foundries . . .

any place where fast,
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is important!
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Wheel Selector on Request
VITRIFIED and RESINOID
GRINDING WHEELS and SEGMENTS

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Timken Establishes Bearing Plant in Brazil

A new bearing plant in Sao Paulo, Brazil, is now under construction for The Timken Roller Bearing Company. Two buildings are presently under construction in the Santo Amaro district of the city. They will be leased by Timken from the Estrutecnica S. A.

Both buildings will afford a total of about 65,000 square feet of floor space.

Ultimate production of the plant is expected to reach 2¼ million bearings a year, with about 250 persons employed. The buildings are scheduled for completion in the first quarter of 1960.

Metalworking Fire Losses Drop Significantly

U.S. metalworking plants managed a reduction of about $5,000,000 in fire losses the past year, according to a report just released by the National Fire Protection Association. Total cost of fire damage and destruction to metalworking facilities came to just under $23,000,000 in 1958, against a figure of about $28,000,000 in 1957.

It was estimated that there were 2,900 metalworking plant fires in 1958, down 200 from the year before.

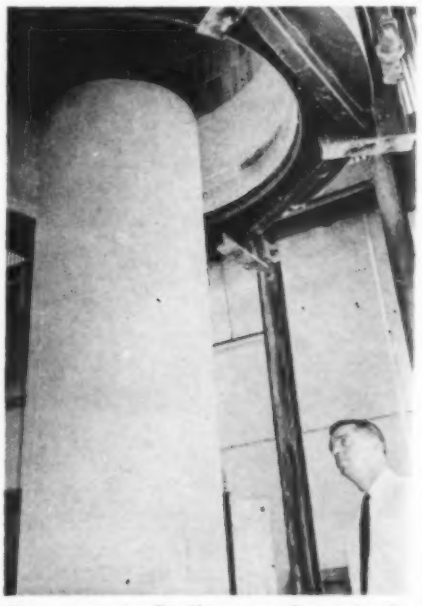
General industrial losses from fires, according to the same source, were down nearly 25% in the same period.

Losses still totalled more than $175,000,000 from 38,400 fires. There were about 41,000 fires in manufacturing plants of all types in 1957.

Ground Ceramic Key to Harnessing H-Bomb Energy

A space age plan to harness the power of the H-bomb for peaceful pursuits is moving toward accomplishment, thanks in part to alumina, the powdery white oxide from which metallic aluminum is produced.

ALCOA is supplying the material for use in a ceramic chamber being built to contain a reaction which may reach temperatures five times that of the sun. The ceramic chamber will form the heart of a device known as the C-Stellarator or "star generator" . . . a term denoting its hoped-for ability to confine solar-type energy.



The ceramic Stellarator above is the largest ever produced from a "high-alumina" material, in this case a patented formula containing 95% aluminum oxide.

It is expected to function by keeping a controlled H-bomb reaction suspended in a powerful magnet field within a tube incorporating the alumina-ceramic chamber.

The liner will be in the form of a cylinder, 49" long and 20" in diameter.

A grinding operation with a 320 grit diamond wheel is most important in

the finishing of the ceramic liner. The piece is ground to a tolerance of plus or minus .001", and the surface is almost polished. When the liner is installed, fittings are squeezed over each end. This takes place under extremely high pressure, causing a phenomenon known as seizure to take place and assuring a tight fit.

Fuel for the Stellarator will be heavy hydrogen. If the theory works, the world's oceans will provide an inexhaustible fuel source and mankind will benefit from millions of kilowatt hours of energy at negligible fuel costs.

ASME Annual Meeting

An estimated 4500 engineers descended on Atlantic City, New Jersey, last week for the annual meeting of The American Society of Mechanical Engineers, to discuss the latest developments in hundreds of fields ranging from rocket ships to textiles.

Over 300 technical papers and discussions were crowded into the week-long session, which required the use of both the Chalfonte and Haddon Hall hotels on the boardwalk.

Among the featured speakers was Lt. Gen. James M. Gavin, formerly director of U.S. Army research and development, now vice president of Arthur D. Little, Inc., Cambridge, Mass. His topic was "The Challenge of the 60's."

A total of ten medals and awards were presented, including the John Fritz Medal, to Gwilym A. Price, president of Westinghouse.

New Missile Material

Model holds a missile dome of Kodak's new polycrystalline "Irtran" optical material. The dome, which transmits the infrared rays that guide a missile to its target, is reported to have improved heat resistance and weathering properties.

In an iceberg or in a J. K. Smit Diamond Tool only a fraction shows above the surface.

Everyone knows about the unseen portion of an arctic iceberg. Many do not realize the unseen factors that lie beneath the surface of a J. K. Smit Diamond Tool, such as . . . our constant research to find still better methods of manufacturing Diamond Tools, the unquestioned integrity of our company since 1888, the manufacturing skills that have been learned and passed on through all those years, and quality control of manufacture for tool duplication.

All these hidden assets count much toward maintaining our position as a leader in the industry today.

When *your* next job specifies a diamond tool for any purpose contact J. K. Smit. Our field representatives are trained and qualified to assist you with any standard or special application.

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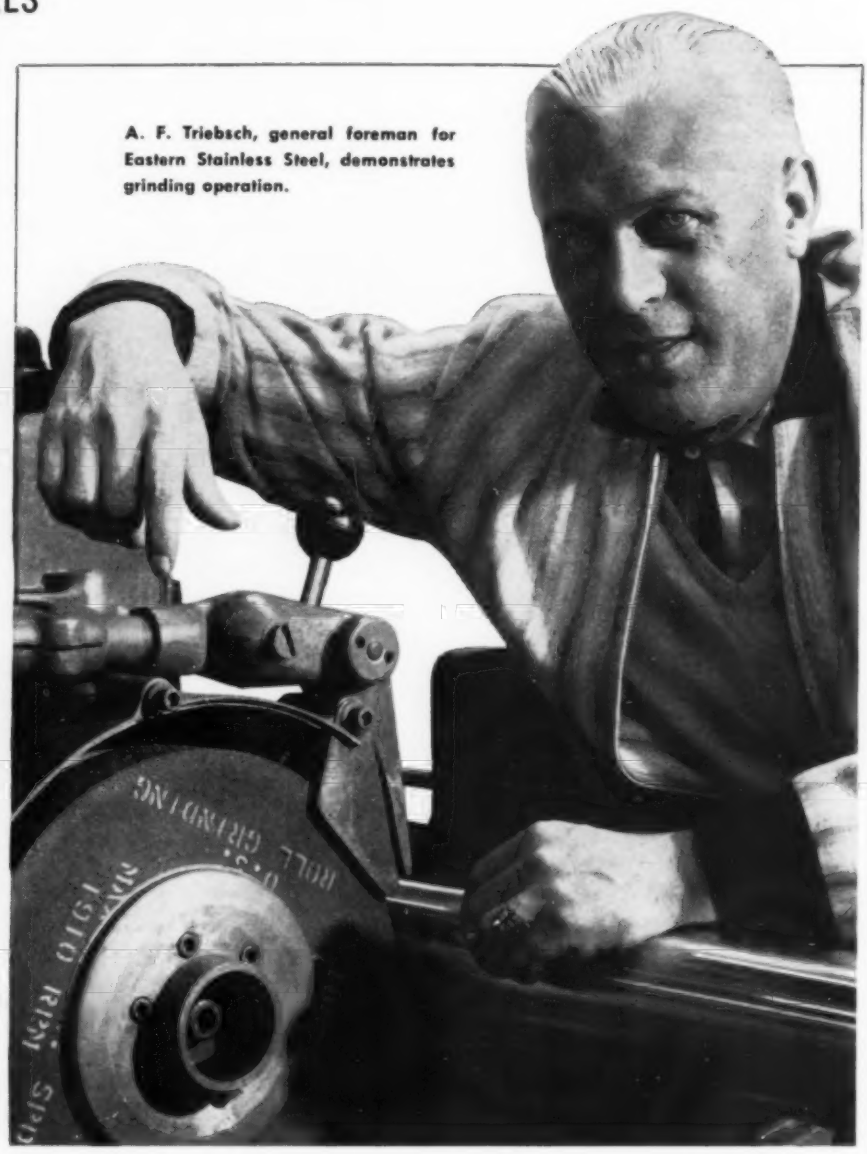
US RUBBER GRINDING WHEELS

NO CHATTER

Production UP 8%!



A. F. Triebsch, general foreman for Eastern Stainless Steel, demonstrates grinding operation.

"U.S." Grinding Wheels help EASTERN STAINLESS STEEL achieve tolerances of 2/10 of .001" in precision work

In producing stainless steel of great precision, the steel passes through a succession of work rolls under a combined force of 59,000 pounds per square inch. All the rolls must be perfectly round and the tiniest defect must be eliminated. To produce a perfectly flat mirror finish, the rolls have to be 2/10ths of .001" perfect!

This is the kind of work Eastern Stainless Steel Corporation turns out every day. To keep their rolls in perfect balance and symmetry they use "U. S." Grinding Wheels. These amazing wheels allow for no "chatter" or vibration, consequently they never groove the roll. Prior to the use of "U. S." Grinding Wheels, at least an hour a day was lost when the operator had to readjust the machine.

Using "U. S." Wheels, Eastern Stainless Steel found many collateral advantages. Maintenance was reduced by more than 20%. "U. S." Grinding Wheels outlast conventional wheels at a ratio of 4 to 1, an obvious saving of 400%.

You, too, can effect important economies and achieve greater precision by turning your grinding wheel problems over to U. S. Rubber.

US RUBBER

Mechanical Goods Division

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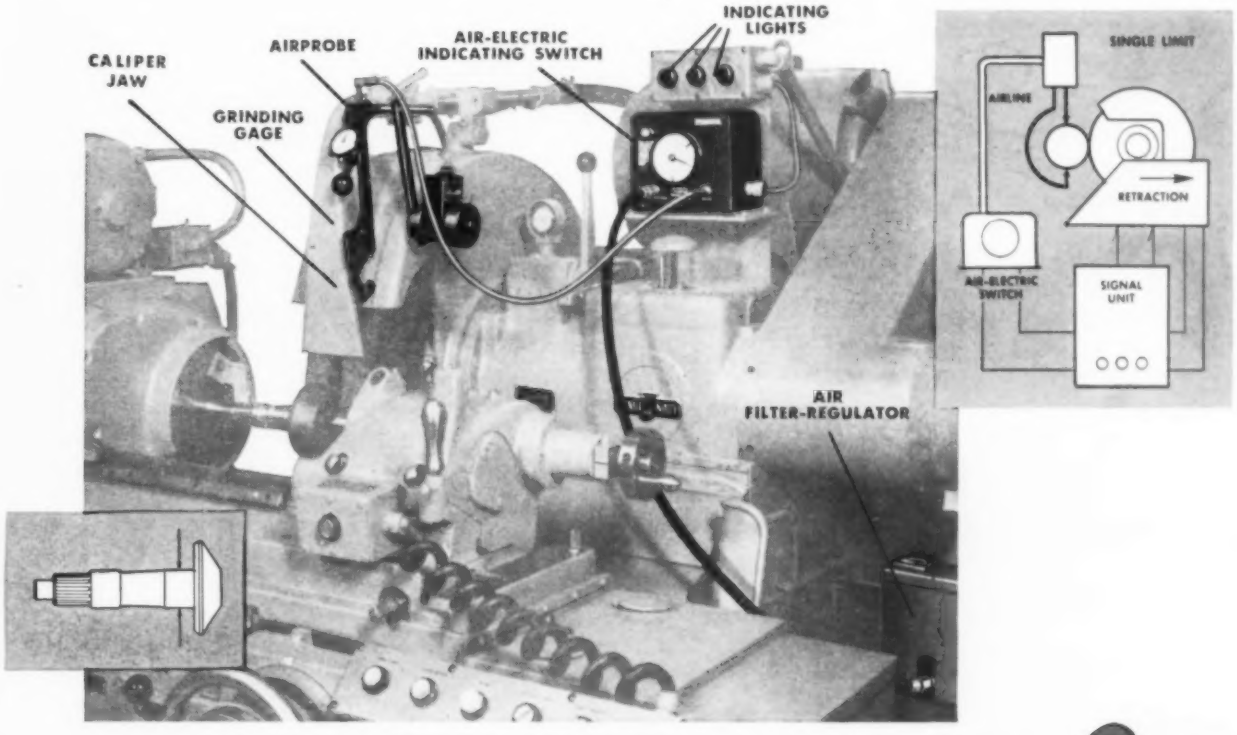
CONTROL FINISH SIZE

Automatically! Economically!



Automatic Control Gaging improves your grinding operation 3 ways . . .

1 It controls on the basis of finish size *only*, thus overcoming the disadvantages of timed cycle or fixed stop grinding. Wheel wear, O.D. variation in work to be ground, "give" in many of the machine elements, and flexing of the work, no longer affect accuracy and piece-to-piece uniformity of the finished part.

2 It controls *automatically*, thus you eliminate any errors caused by operator fatigue, inexperience, or inattention. The Federal automatic control gage never tires, will hold part size to .0001" or better on a good machine, and is easily adjusted to control different sizes of work. Its air-electric system overlooks minor surface irregularities which confuse size readings of other gages.

3 Automatic control gaging makes it possible for one operator to handle two grinders performing the same or different operations. Here's an actual case history of direct labor cost savings:

	MEN	MACHINES	COST PER PIECE	PRODUCTION RATE (pieces per 8 hr. shift)
BEFORE			$.03585	1344
CONTROL GAGING INSTALLED				
AFTER			$.01526	1386

SAVINGS (per piece) . . . . . $.02059
RATE INCREASE (per shift) 42
TOTAL SAVINGS (per shift) $28.59
EQUIPMENT COST AMORTIZED — 60 DAYS

HOW IT WORKS

The Federal automatic control gage measures the work continuously *as metal is being removed* and automatically retracts the wheel the instant finish size is reached.

EASY TO INSTALL

This standardized Automatic Control Gage (Model 133M-103 illustrated) is stocked for speedy delivery. Only a few components to install. Easily applied to any plain grinder having hydraulic wheel slide. Can also be used in connection with wheel slide stop to *additionally* provide spark out.

Federal control gages are also available through machine tool manufacturers for control of either plain or I.D. grinders and are supplied as part of the grinder package. When discussing machine tool requirements, be sure to specify FEDERAL gaging. Federal maintains close engineering alliance with leading machine tool manufacturers. They, too, will be glad to discuss automatic control gaging with you.

For more information, contact the nearest FEDERAL representative or write . . .

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Ask **FEDERAL** *First*

for recommendations in modern gages . . .

Dial Indicating, Air, Electric, or Electronic – for Inspecting, Measuring, Sorting, or Automation Gaging

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Season's Greetings

Our sincere thanks to those of you
we have served in 1959.

We wish for each of you all the joys
of the Holiday Season and a New Year
full of good health, happiness and prosperity.

CORTLAND

CORTLAND GRINDING WHEELS CORPORATION, CHESTER, MASSACHUSETTS

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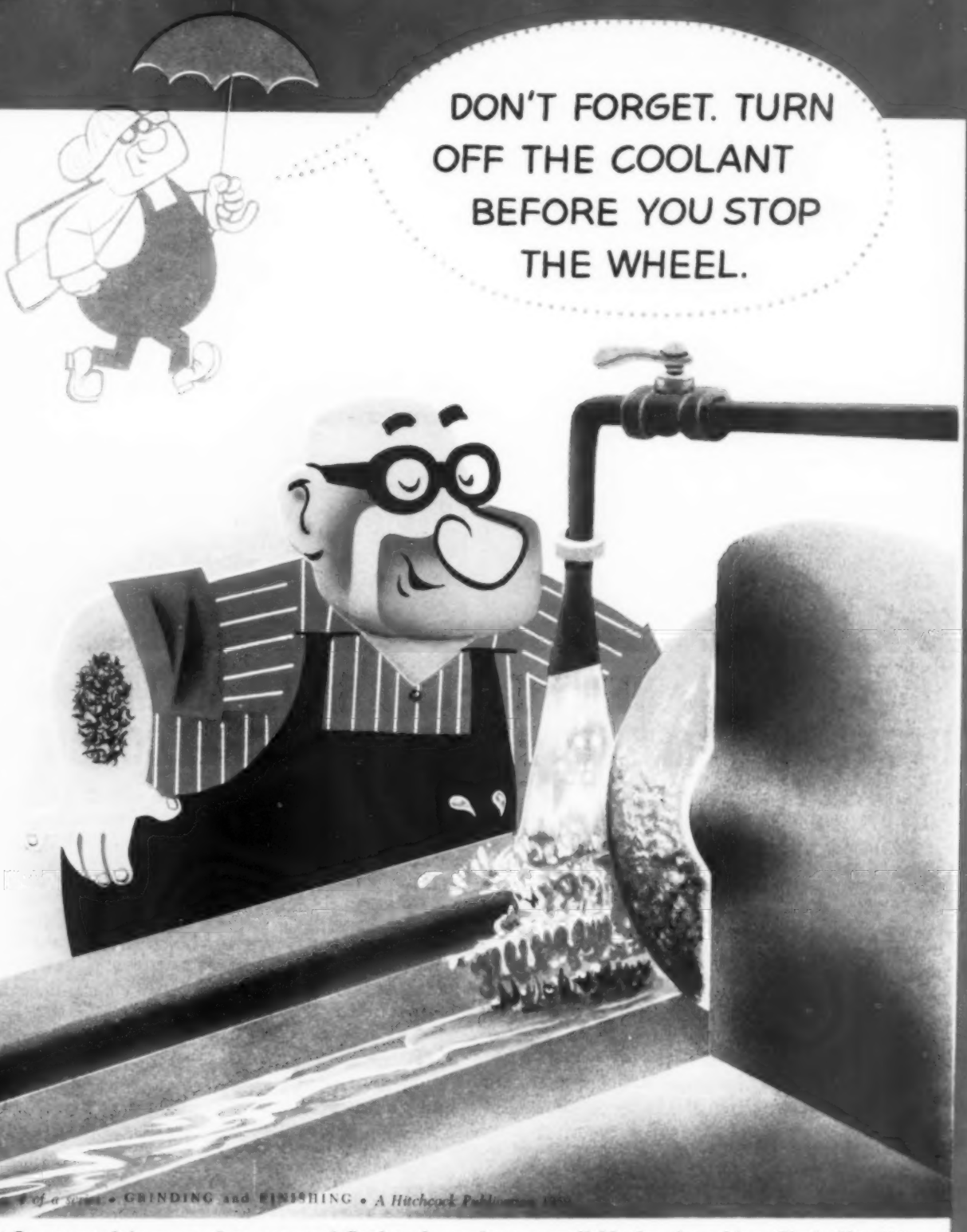
SAM SAFETY says:



Put Sam to work in your safety program! Copies of the above poster and of previous posters in the series are available for the asking. Circle No. 100 on the Reader Service Card.

Introducing the NEW MODEL 1-A SEVER-ALL Machine... CUTS AT 3 to 6 SECONDS PER SQUARE INCH—ECONOMICALLY

MANY EXTRA FEATURES AT A DELIVERED COST UNDER $500

You get the cut quality and capacity of machines nearly three times as expensive when you use the new Model 1-A SEVER-ALL oscillating dry abrasive cut-off machine. Available from your distributor's stock. Here's why the #1-A SEVER-ALL is ideal for industrial and machine shop operations:

BIG CAPACITY • Up to 2″ square solids, 3½″ O. D. pipe and tubing, 3″ angle iron, and 4″ channels . . . of cold rolled, stainless, and alloyed steel; cast iron; and nonferrous metals. Wheel oscillation, an exclusive feature in this price range, provides this *above-average* capacity.

SPEED • Cuts a 2″ x 2″ hardened steel bar in 16 seconds . . . other shapes and sizes at 3 to 6 seconds per square inch.

QUALITY • Clean, smooth cuts, even on large sections, because wheel oscillation provides cooler cutting.

ECONOMY • In addition to low initial cost, the Model 1-A SEVER-ALL is inexpensive to operate . . . occupies minimum floor space . . . requires little or no set-up time . . . eliminates annealing costs . . . gives more cuts per wheel because of oscillation.

SIMPLICITY • Just two SEVER-ALL cutting wheel specifications will do *all* your SEVER-ALL cutting jobs. A positive, screw-type vise holds all regular shapes, and an adjustable work stop provides speed and accuracy.

ANGLE CUTS • Optional accessory permits cutting angles up to 45° in either direction.

NEW SEVER-ALL AVAILABLE FROM DISTRIBUTORS

Very likely your own distributor already stocks the Model 1-A SEVER-ALL machine and wheels. If not, let us know, and we'll give you the name of your nearest SEVER-ALL distributor. Also, we'll be glad to send you complete details on this new machine. Just ask for **Bulletin DH-106.**

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AMERICAN CHAIN & CABLE

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You Asked . . .

ARTHUR RAKESTRAW
Contributing Editor

Dressing Spiral Form in Centerless Regulating Wheel

• Is it possible to dress a spiral form in the regulating wheel on a centerless grinder? If so, how is it done?—S. S., Lansdale, Pennsylvania.

As far as we know, it would be impossible to true a spiral form on a centerless regulating wheel while the wheel was mounted in the grinder. Such an operation would of necessity be performed on a screw cutting lathe or a truing machine designed with a selective traverse control.

It would be necessary to remove the regulating wheel assembly, mount it on a suitable arbor between machine centers, and with a truing diamond mounted in the tool post. When the proper gears had been selected to provide the required helix, the form could be trued in much the same manner as threads are cut.

Grinding Rubber Rollers

• In our machine shop there is a Cincinnati cylindrical grinder 12" x 36" which is not being fully used. We should like to try grinding rubber rollers, which are now sent to a vendor, on this machine.

Since we have very little experience in this respect, I wonder if you can help and advise us in tackling this project. The basic design of the part is cast iron, which is turned on an engine lathe to 1.678" O.D. The part is then sent out to a vendor, who rubberizes these rollers with a coating of 55 to 60 durometer rubber to 2-1/16" O.D. He then grinds them down to 2.032" O.D. We believe we could do the latter operation on the Cincinnati cylindrical grinder and might save a sizable amount of money.—H. C., Oakland, California.

There is no doubt that having gained some experience through some experimenting you will be able to finish these rubber-covered rolls with satisfactory results.

Most of the rubber rolls of this type are now ground dry, hence the advisability of providing a suitable exhaust system to take care of the rubber chips and swarf. The exhaust also functions as a cooling source in minimizing the heat produced by friction.

In some instances an additional jet of air is directed from the top to the point of grinding contact. With the exhaust nozzle directly below the grinding contact, all or most of the rubber dust is removed and the abrasive wheel face is kept free of loading.

Because of the probability of excessive heat, a resinoid bonded silicon carbide wheel in grit size from 24 to 46, in a comparatively soft grade, is used.

The amount of infeed is such as to provide a continuous cut across the roll. Traverse speeds are comparatively slow.

Regardless of the precautions that are taken in grinding the roll, there will undoubtedly be traverse marks on the periphery.

Finishing of the roll is accomplished on a speed lathe. The roll is covered with powdered soap stone and revolved at the highest speed that balance of the roll and safety will permit. Rough polishing is accomplished with coated abrasive cloth, 50 grit aluminum oxide. The final finish is produced with 150 grit coated cloth.

Care must be taken in grinding so that allowance will be left for final roll sizing after polishing.

Because of the soap stone dust and powdered rubber, it is advisable to provide a suitable exhaust system for the polishing lathe. In addition, the operator should be provided with a protective mask to wear while working on the rolls.

Dry Ice as Coolant

• Would it be possible to use a container of dry ice, connected by a hose to the grinding surface of a wheel, to cool the wheel? In other words, can dry ice be used as a coolant?—T. J. M., Philadelphia, Pa.

Dry ice is a compressed gas and does not liquefy. Unless a blast of air were to be forced through the container, there would not be any cooling effect at the point of contact.

In the majority of grinding operations, the lubrication of the abrasive wheel is of equal importance with the cooling effect, in that the freer the cut, the less heat is generated.

You Asked . . . has become a very popular page in GRINDING and FINISHING since it was established over a year ago. The questions have covered everything from detailed operating problems to rather broad basic ideas. Replies have been equally varied.

You can use either the READER SERVICE CARD or a separate letter to submit your problem or question. We'll get it answered as soon as possible and send you a reply, in addition to the published answer.

—The Editors

BELLOWS-AIRBORNE *Electronic* INFEED GRINDER CONTROL SYSTEM

HOLDS WORK TO .0002" IN PRODUCTION QUANTITIES

(To .000070" On Parts Smaller Than ½")

Electronic unit continuously monitors position of slide relative to workpiece in order to obtain predetermined finished size . . . Variations in size of workpieces do not affect finished size . . . Compensation for wheel wear and variations in machine elements and operating conditions can be made without shutting down the machine . . . A single control knob permits adjustment for size while grinding is in process.

INCREASES OUTPUT OF EACH WORKER AND MACHINE

Pre-grinding operations are eliminated . . . Speed and ease of set-up reduces downtime.

CUTS DIRECT AND INDIRECT GRINDING COSTS

Higher production per machine and per worker and elimination of "rough grinding" time means that fewer grinders and fewer workers are required to maintain existing production requirements.

635-C

The Bellows-Airborne Infeed Grinder Control System consists of a modified MICROtrol Control Unit, manufactured by the Airborne Instruments Laboratory division of Cutler-Hammer, Inc., linked to a special Bellows Grinder Feed. Designed primarily for use with a Cincinnati #2 Centerless Grinder in applications where the part is not ground over its entire length (such as headed pins, rounds or pins of divided diameters, or parts which cannot traverse between the wheels), the unit offers both coarse and fine feeds and can be set for either continuous cycling or single cycle operation.

For complete information, without obligation, write Dept. GF-1259, The Bellows Co., Akron 9, Ohio

The Bellows Co.

DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

AKRON 9, OHIO

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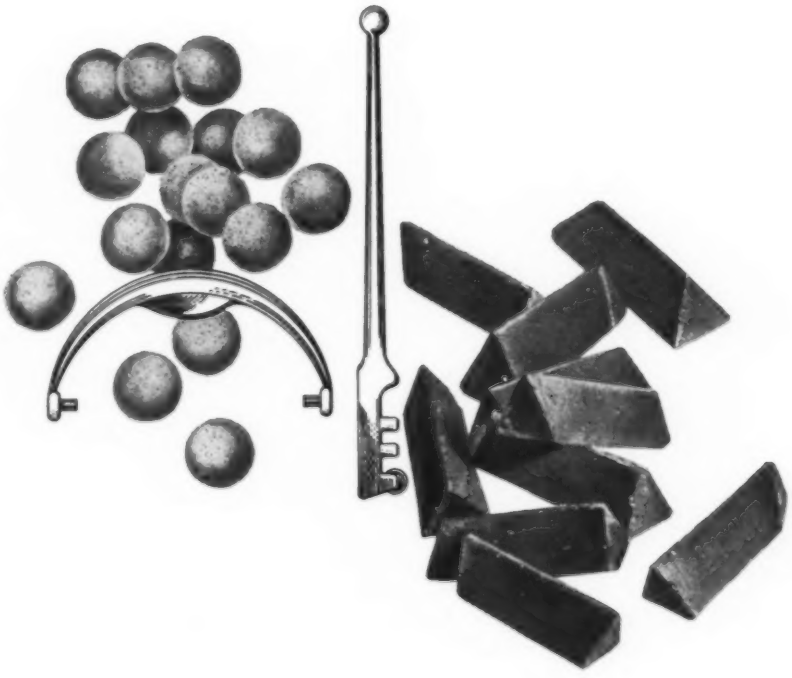
Barrel Finishing is best finishing

...with TUMBLEX bonded abrasives*



Your sure way to cut finishing costs-per-piece is to combine the best barrel finishing techniques with the best abrasives. Norton can help you make the right choices.

Among the wide variety of Norton barrel finishing abrasives, bonded TUMBLEX abrasives are made of ALUNDUM* abrasive in four shapes — "T" triangles, "S" spheres, "TP" triangular pins, "RP" round pins. Available in many sizes, they provide fine, uniform finish, short-time cycles, long, even wear and sure savings on many finishing jobs.

Send samples of parts you finish to our Sample Processing Department. We'll barrel finish, return samples and report the methods and abrasives you need to improve quality and cut costs. NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

*Trade-Mark Reg. U.S. Pat. Off. and Foreign Countries

NORTON
ABRASIVES

G-380

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NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals — BEHR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

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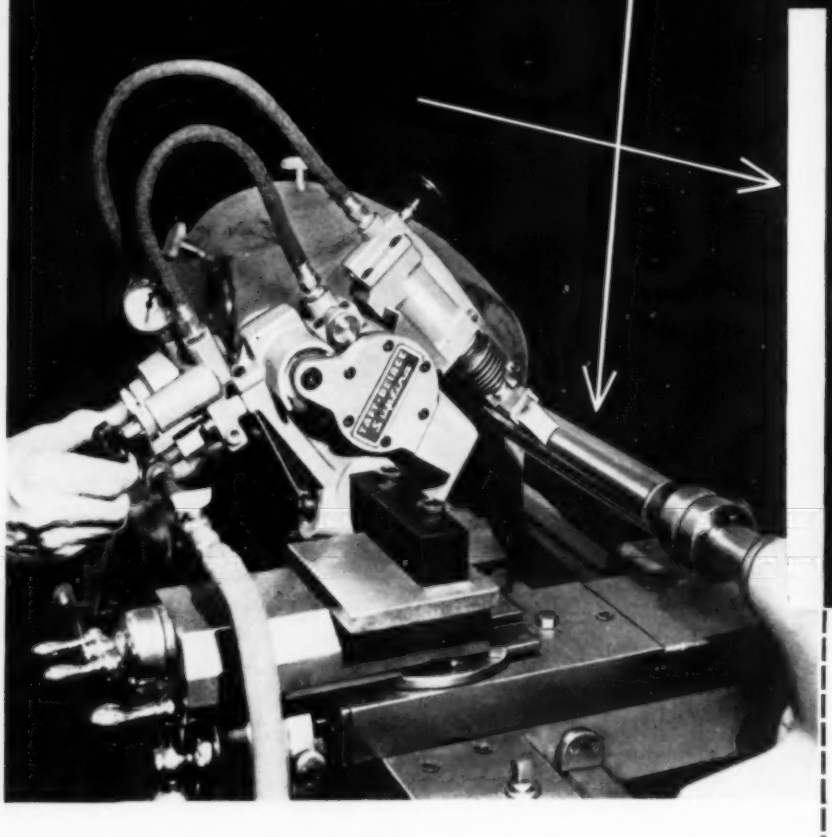
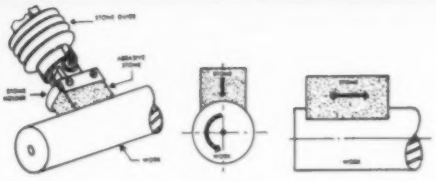
THE NEW WORD IN METALWORKING IS MICROSTONING!

NOW! SIMPLIFIED, LOW-COST CORRECTION OF SURFACE GEOMETRY WITH TAFT-PEIRCE/SUPFINA MICROSTONING



This dramatic "before and after" evidence on a Talyrond chart shows how Microstoning corrected the surface geometry of a die set guide pin. The outside trace shows an average roundness of .00028" as ground. After Microstoning (inside trace), the roundness was improved to an average of .000030". Each scale division is .000020".



Here's what happens . . .

Microstoning is a low-pressure, low temperature abrading process using stones of various grit sizes. Stones are placed against the work with light pressure and vibrated from 1900 to 2500 times a minute as the workpiece rotates. The stones shape themselves to the mean radius of curvature, and more pressure is applied at high spots. This produces a fast and simplified correction of surface geometry that is demonstrated graphically by the Talyrond chart above.

Microstoning with Taft-Peirce/Supfina machine tool attachments produces a controlled microinch surface finish, removes cutting tool marks and grinding flats, and dramatically improves roundness.

The unique, patented Supfina design makes this precision surface correction possible. A free-floating piston, driven by compressed air oscillates an abrasive stone at high frequencies against the work — to achieve both desired finish and geometric correction in ONLY ONE OPERATION! All types of metals can be microstoned as well as hard plastics and other nonmetallic materials.

Try Microstoning on your product! Taft-Peirce/Supfina Attachments are low in cost and simple to operate. They can be used on lathes, boring mills, planers and other machines — to produce a precision surface and improve the performance of spindles, sealing rings, metal processing rolls, and bearing surfaces. Microstoning can be used on both flat and round surfaces. Contact your nearest Taft-Peirce Machine Tool Dealer for full information or write direct.

Finish it with **TAFT-PEIRCE** *SUPFINA*

TP9-19

TAFT-PEIRCE MANUFACTURING CO., 19 MECHANIC AVENUE, WOONSOCKET, RHODE ISLAND

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Design for Grinding

RICHARD L. McKEE • Associate Editor

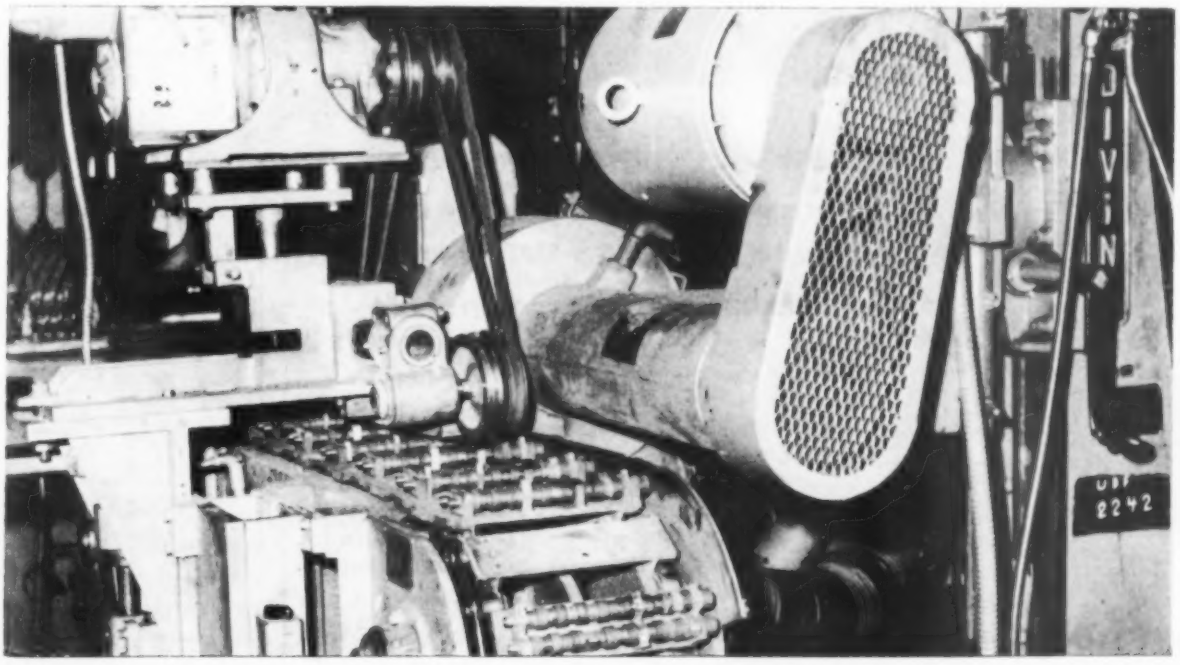
Conveyor-Grinder Triples Output

Production per man-hour on "pencil-pointing" operation jumps 300% when work-holding conveyor on grinder supplants off-hand grinding in chamfering alloy steel rods for jet turbine blades.

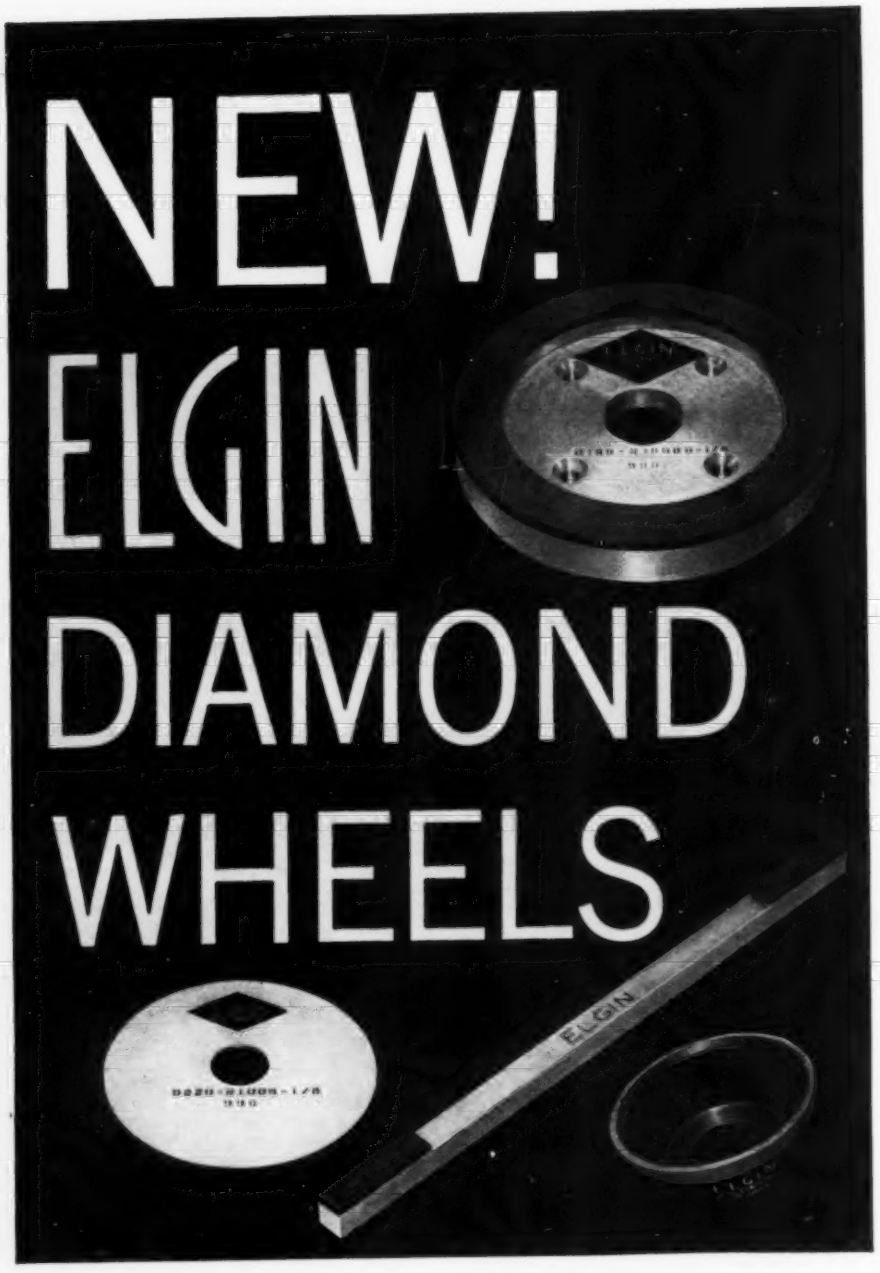
• A key part of the manufacture of precision turbine blades for jet aircraft at Utica Drop Forge Division of Kelsey-Hayes is a sort of pencil-pointing operation which leaves a blunt-ended chamfer on the rods.

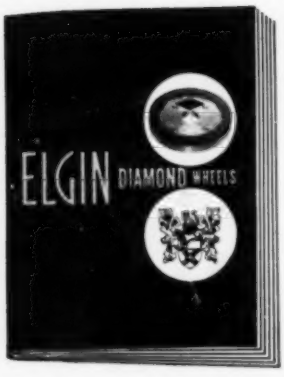
As received, these rods are 6" to 18" long, and on the order of ½" in diameter. The chamfer is needed because of a later upsetting operation which precedes forging. Without it, the metal would not form properly.

This used to be an off-hand operation. Six men were required. They rotated rods against grinding wheels, one at a time, until the chamfer was formed. Production was about 360 pieces per hour per man, and probably less in the afternoon. The chamfers probably got a little less accurate later in the day, though



Each pair of rollers on the conveyor holds one rod. The V-belts, running under a platen, rotate the rods as they are passed under the grinding wheels to form the required "pencil-point" chamfer.





Now – ELGIN offers you a complete line of Golden Circle Diamond Wheels with *guaranteed diamond content*

Diamond wheels—every shape, every size—resinoid, metal, or vitrified bonded—they're all available from Elgin! Guaranteed diamond content means more pieces ground per wheel, more return on your wheel-dollar. Consult an Elgin field engineer—his broad abrasives experience will help you select the right grit, wheel-shape, and bond—the wheel that will keep your grinding costs down. Our new diamond wheel catalog greatly simplifies ordering. Write for it today.

Abrasives Division
ELGIN NATIONAL WATCH COMPANY
ELGIN, ILLINOIS

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this was not really a precision job.

With the illustrated machine, with one man loading, production jumps to 1140 pieces per hour. With two men, this rate can be doubled. In short, two men can now produce what six used to.

There are three basic components of the grinder: the conveyor, the belt assembly and the grinding heads.

The conveyor carries the work. It is fitted with nylon rollers on 38 work holders around its circumference. Rods are laid into these work holders by hand, because certain numbers of the rods must be faced to the outside. (This is to provide a reference to the lot in which the blade was made, in case of blade failure.) The machine can be modified for automatic loading, if desired. The conveyor makes one complete revolution per minute.

The belt assembly runs at a higher speed than the conveyor. Running under a platen, the belts rotate the rods and hold them against the grinding wheels. The work holders are designed so that the rods can rotate freely, and the nylon rollers help keep the rods from moving laterally.

In the head units are three 14" x 2" x 2½" grinding wheels. Two are vitrified aluminum oxide, 36 grit, M grade, 5 structure. The third is the same, except that it is slightly finer grit—46 instead of 36. The head units are adjustable.

This machine was custom-built for Utica Forge by Divine Brothers. Modified with other types of work holders, to fit specific applications, the principle of conveying work under a grinding wheel or a series of wheels is believed to be promising for other applications in high-volume non-precision grinding.

• • •

"Talk about your new sounds! Wait'll you hear this."

American Society for Abrasives

Detroit Chapter

The Macklin Company played host to the Detroit Chapter of the American Society for Abrasives at their Jackson, Mich. plant on Thursday evening, October 22.

Over 120 members attended the meeting. **Mr. L. K. Pruett,** National Chairman, stated that this was one of the largest groups ever to attend such a gathering.

The members were divided into 5 groups and conducted on a complete tour of the Macklin plant by **Robert Franklin,** president of the company; **Richard Lane** and **Malcolm Hunt,** vice presidents; **Ted Reynolds,** head of Sales Engineering; and **Ward Cruger,** and **Bruce Yocum** of the Sales Dept.

The tour followed an actual grinding wheel order starting in the area where bulk abrasive grains are stored, and ending in the shipping department to show how grinding wheel orders are packed for shipment.

A buffet in the company's cafeteria concluded the evening's activities.

Long Island Chapter

"Grinding vs. Machining" was the topic on which Peter Van Ekelenburg, eastern territory representative of Mattison Machine Works, Rockford, Ill., talked to members and guests of the Long Island Chapter at the November meeting, Wednesday, November 11, at Wheatley Hills Tavern.

The talk centered around recent findings by the company concerning cost reductions on applications where one grinding operation has replaced a two-step hogging and grinding sequence.

Following the talk, he presented a film showing shop applications of a variety of grinders. A discussion period followed the film.

Members and guests at the Detroit Chapter's October meeting held at Macklin Company, Jackson, Michigan. From left to right in the front row are: Dennis Hurley, Brown Star Grinding Wheel Company, treasurer; Cal Edwards, Ford Motor Company, past president; Lee Pruett, Ford Motor Company, national chairman; Fred Schlie, Detroit Transmission Division, first vice-president; Dick Sorenson, Detroit Transmission, second vice-president; and Bill Hall, Chrysler Corporation, membership chairman.

Western Massachusetts Chapter

The October meeting, on the 19th, featured a brainstorming session by "The Springfield Ten" about cylindrical grinding problems. **Paul Floyd,** vice president, Waltham Grinding Wheel Company, headed up the discussion.

In September, the topic for discussion was "Electrolytic Grinding," and the speaker was **William E. Woods,** field engineer, Anocut Engineering Company, Chicago.

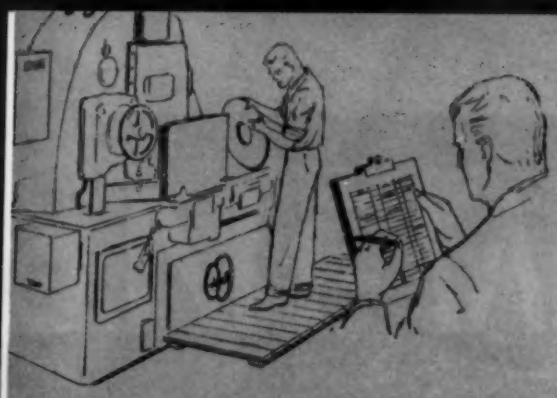
Both meetings were well-attended, with a large proportion of guests. **Samuel C. Finnell,** assistant to the president, American Abrasive Company, and acting chapter president, anticipates an increase in membership as a result of this attendance.

Welcome to NEWSCHIPS

Recently there came across the desk the first issue of ASA NEWSCHIPS, published to promote the exchange of information about products, operations and people in the abrasive industry.

It is also planned to be a means of recognition for individuals and groups in the industry, and to promote industry status, as well as good safety and health practices. Finally, it provides a means for members to become better acquainted with each other.

It is a good sign of growth when an organization becomes big enough to print a newsletter to its members. The ASA page in GRINDING and FINISHING will of course be continued, to provide news of ASA for our readers who are not members of the society.



Due to the continuing requests for the standard time data articles which have been run in GRINDING and FINISHING in the past, we are now presenting this material again in a four part series. This series will include additional areas not covered in the original work. Areas to be covered will be toolroom, snagging, surface, cylindrical and centerless.

Standard Time Data For Grinding

By E. A. CYROL and R. L. BORCK
E. A. Cyrol & Co., Chicago, Ill.
Management Consultants

● Standard time data are families of time values for elements that make up an operation. All repetitive cycles consist of elements which can be observed, described, timed and averaged to obtain standard time data. Using the data involves putting together the proper elements and their time values to estimate the total time for a given operation. The time values are based on averages. Almost all of the guessing is taken out of estimating time data and this is the main value of standard time data.

Standard time data is the heart of cost reduction programs. It is now being used for many more operations than were considered feasible. Costs, production, scheduling, machine loading and incentive programs depend on accurate standard time data. Because of the cloud of mystery many people have built around grinding operations, standard time data has been considered unworkable. But, regardless of the type of operation, if enough readings are averaged and a little common sense is added, an accurate standard time can be developed which would be of great value to any or all of the programs mentioned above.

The following pages and articles in this series will show how to develop usable standards for your operations and suggest time values which have been obtained through work in many shops.

THE ACTUAL TIME VALUES GIVEN IN THIS SERIES OF ARTICLES SHOULD BE REGARDED AS BENCHMARKS.

Why Have Standard Data for Grinding?

One of the more important reasons for standard time data is to establish an equitable wage incentive plan. Unfortunately it is the habit of many in management, in general, and shop supervisors, in particular, to think that grinding machine operators should be excluded from wage incentive plans because they are doing precision work. However, to look at a chart of the basic wage structure and total take home earnings of one of these typical plants it is disheartening to see that the skilled worker on daywork is only earning as much, if not less than other employees in a lesser skilled classification with incentive earning opportunities. (Figure 1)

By extending wage incentives in these areas through the use of standard data, the higher skills are rewarded two-fold. The first is an increase in earnings of approximately 20%; and the second, with earnings being based on higher base rate, the job really does pay more. (Figure 2)

This is not a one way street, management will also profit from the change. Figures 3 and 4 illustrate a typical Daily Labor Report showing a departmental operating cost for production work before and after wage incentives were applied through the use of standard data.

Production standards based on standard data tend to be more consistent, for three main reasons: (1) Standard data are a composite of many studies. These averages are better than any of the individual values. (2) Exactly the same time is allowed in a standard for an element each time the element occurs in a work cycle. (3) Time for variable elements reflects the proportionate difference in time due to a physical difference in the part.

Standard data developed in the plant where they will be applied are easier to explain to employees, supervisors, and union representatives than the individual study method. And once the data are understood and accepted, they cease to be a source of trouble. Standard data seem to "make sense" because the employee has in his work experience unconsciously made such comparisons of one production standard to another. Standard data explains the differences readily and acceptably on the basis of differences.

Five Steps in Establishing Standard Time Data Are As Follows:

1. TIME STUDY THE OPERATION with several operators over several days. Record all the work

elements carefully, noting especially the end points. Time each element in the smallest time increment practicable, to the hundredth of a minute.

2. POST THE TIME STUDY DATA to comparison ("spread") sheets so it can be easily analyzed. In this form, work elements which are constant and those that vary can be quickly spotted.
3. ANALYZE THE DATA to determine constant and variable elements. Chart the variables. At this point, look for possible methods improvements and incorporate them in the standard work cycle.
4. PERFORM A CHECK STUDY to determine the validity of values found in (3). This will also establish time values for the new elements resulting from methods changes.
5. WRITE UP THE STUDY in permanent form, including detailed element descriptions, tables of time values, etc. Prepare standard data work sheets for finding total time for an operation.

Taking the Time Study

Fundamental to the taking of time studies for developing standard time data is the accurate description of the elements that comprise the work cycle. The time study operator must clearly define these elements and their end points, or watch reading points, so that any future check time study will compare like elements with like elements. This written description is also necessary to insure that any future changes will be properly made. Unfortunately, the benefits of standard data are often lost because the elements have not been carefully defined and written down.

Another important point to be emphasized in taking the time studies is that a large number of studies—say, seventy-five to a hundred—must be taken to insure accuracy.

The Check Studies

Testing the standard time data must be done without prejudice; if shortcomings show up, they should be taken into consideration and the data revised and improved. A flaw ignored at this point will come up again and again to plague the man responsible for production standards.

It is good to take the test studies of operations which were not studied during the development of the data, as well as operations which were studied at that time. Usually about ten studies taken according to the original elemental breakdown will test the standard data. Of course, these studies should be taken of large parts and small parts; operations having many and just a few elements should also be included This is important so that the entire range of data is proven ahead of its "bath of fire" when it is released to the shop as production standards.

The Standard Data Work Sheet

One of the many advantages of standard data is the efficiency with which a good production standard can be determined. But this efficiency depends on a well-designed work sheet. A properly designed work sheet can reduce by about a third the time required to determine a standard, prepare a set-up card, and make out a tool list.

TOUCH-UP OF SINGLE POINT CARBIDE TOOLS

Incentive coverage limited to direct labor operations can create some resentment among the dayworkers who supply or service the production worker on incentive. The reason is obvious. This part discusses the development and appli-

Comparison of Hourly Earnings—Day Work Versus Incentive Work.

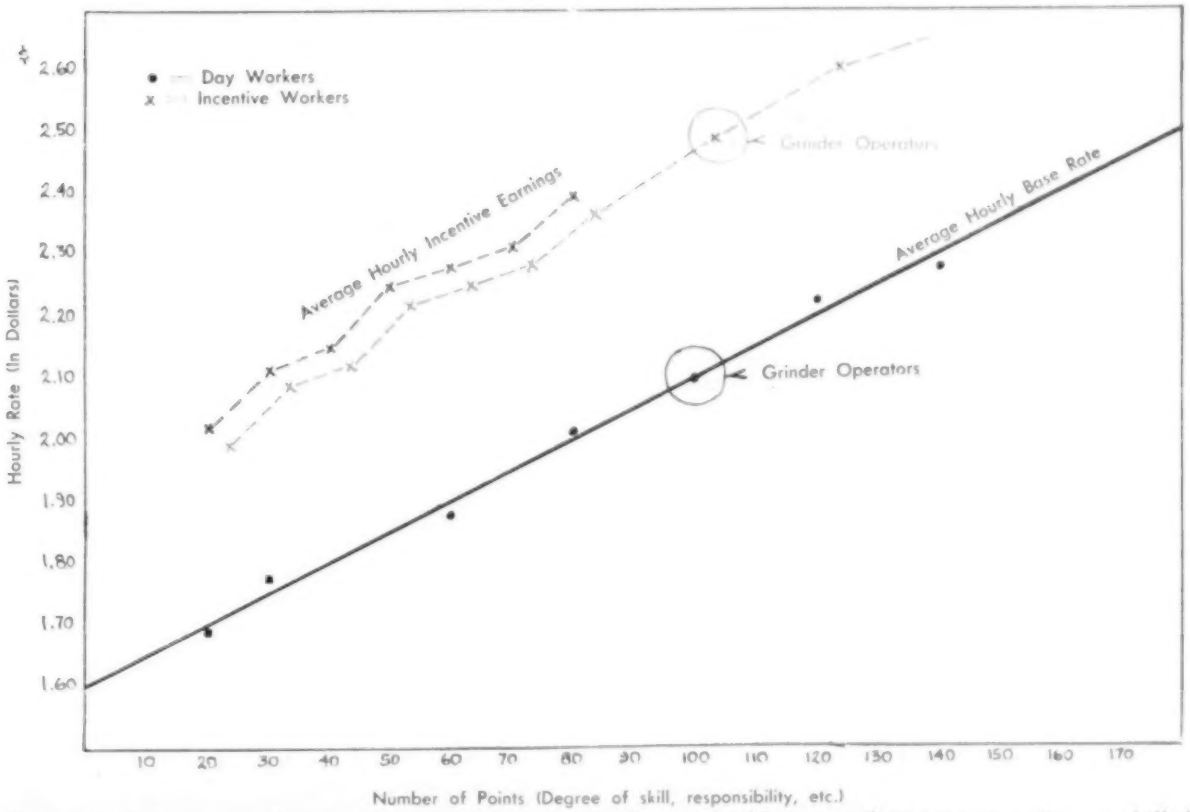


Figure 1. Before extending wage incentives to skilled workers.

Figure 2. After extending wage incentives to skilled workers.

cation of standard data for one of these areas, a Centralized Carbide Tool Touch-Up area.

Before the industrial engineer undertakes this program a brief analysis should be made to determine one main factor, this being, can other work be performed by the tool grinder and can it be measured? As the tool grinder's activity is of an attendant nature (he must always remain near the service window) and as the potential of incentives are weakened where incentive payment is on an "on again—off again" basis, the attempt should be made to have work of a comparable nature available for the tool grinder in order to avoid "idle" time. Having this added work measured will then place the tool grinder's entire time on an accumulative earnings per shift basis.

The "extra" work that was used and measured in this application was the inspection and touch-up of tools returned from the shop after job runs have been completed and prior to being put away in the tool crib.

Handling and Grinding Elements

1. Get Tool
   a. From Window — Per Tool .26 min.
   b. From Bench — Per Tool .04 min.

   Includes time to get the tool from the window, including receiving the necessary information regarding the tool from the operator or to pick up the tool from the bench in preparation for moving to the grinder.

2. Change and Set-up Tool in Grinder. Per Occ. .46 min.

   Includes time to clamp the tool in the table vise, adjusting the universal to produce the desired tool angles, positioning the tool at the grinding wheel and starting the wheel.

3. Unclamp and Aside. Per Occ. .09 min.

   Includes time to remove the tool from the table vise and to place aside.

4. Aside Tool Only. Per Occ. .03 min.

   Includes time to place tool aside after hand-held tool grinding.

5. Grind Tool.
   a. Cutting Angles and Nose Radius — Per. Occ. .73 min.
   b. Nose Radius Only — Per. Occ. .16 min.
   c. Rake Angles — Per. Occ. .77 min.
   d. Chip Breaker — Per. Occ. .58 min.

   Includes time to touch-up the carbide tool to restore it to its proper condition for machining, to inspect the tool visually or with a protractor as necessary. Separate times are shown for individual angles to be ground and are expressed on a per tool per occurrence basis.

NOTE: Since relief and clearance angles require grinding less frequently than the above, and utilize different wheels than what has been provided in the touch-up area, allowances for grinding them is not included in this data. Inspection of the tools returned to the crib will reveal the need for grinding and at this time will be sent to the tool room for complete grinding. Periodic re-grinding of this type will facilitate intermittent tool touch-up and aid in tool maintenance.

6. Boring Bar Holder.
   a. Get Holder and Clamp Tool — Per Occ. .17 min.

DAILY LABOR REPORT
Production Work Only

Department: Grinding — Date: 5-19-59

Clock Number	Name	Base Rate	Part No.	Oper. No.	Pieces	Std. Hrs. Per 100	Actual Hrs.	Earned Hrs.	Cost
191	J.B.	$2.10	C-26	20	80	—	5.9	—	$12.40
192	A.H.	2.10	C-30	20	160	—	7.1	—	14.91
193	R.B.	2.10	D-29	25	185	—	6.1	—	12.81
194	L.C.	2.10	A-530	35	50	—	4.4	—	9.25
195	C.M	2.10	C-24	20	250	—	4.9	—	10.30
196	R.L.	2.10	A-129	25	425	—	6.7	—	14.08
197	J.R.	2.10	A-200	40	280	—	5.3	—	11.14
							40.4		$84.89

FIGURE 3
Typical day work report. Actual hours reflect day work performance of approximately 75%.

DAILY LABOR REPORT
Production Work Only

Department: Grinding — Date: (After Incentives*)

Clock Number	Name	Base Rate	Part No.	Oper. No.	Pieces	Std. Hrs. Per 100	Actual Hrs.	Earned Hrs.	Cost
191	J.B.	$2.10	C-26	20	80	5.550	3.4	4.4	$ 9.25
192	A.H.	2.10	C-30	20	160	3.333	4.1	5.3	11.14
193	R.B.	2.10	D-29	25	185	2.500	3.7	4.6	9.66
194	L.C.	2.10	A-530	35	50	6.650	2.6	3.3	6.94
195	C.M.	2.10	C-24	20	250	1.490	3.1	3.7	7.77
196	R.L.	2.10	A-129	25	425	1.180	4.2	5.0	10.50
197	J.R.	2.10	A-200	40	280	1.430	3.3	4.0	8.40
							24.4		$63.66

FIGURE 4
*The above report was prepared after the incentive plan was installed and the department was averaging 125% efficiency. The same piece counts were used as shown on Chart 3 and the Actual and Earned Hours are based on the individual employe's average per cent of efficiency.

Results of the comparison show the following:

25% Reduction in direct labor operating costs.

40% Increased machine capacity.

$.51 More *per hour* for the operator.

Carbide Tool Touch-Up Standard Data
Calculation of Per Tool Time
Tools Returned From Setups

Ele. No.	Element		Min.
1b.	Get tool from bench	Per Tool .04 X 220 X 100.00%	8.80
2.	Clamp & setup	Per Occ. .55 X 220 X 80.00%	96.80
5d.	Grind chip breaker	Per Occ. .58 X 220 X 80.00%	102.08
2.	Re-setup	Per Occ. .46 X 220 X 50.00%	50.60
5c.	Grind rake angles	Per Occ .77 X 220 X 50.00%	84.70
3.	Unclamp & aside	Per Occ. .09 X 220 X 80.00%	15.84
	Allowance for Service Window Interruptions:		
	Unclamp & aside tool	Per. Occ. 60% [.09 x 220 X 80% X 28.9%] 57.1%	1.57
	Reclamp & setup	Per Occ. 60% [.55 x 220 x 80% x 28.9%] 57.1%	9.60
11.	Walk to Excello [.01 + (.002 x 5')]	X 220 X 100.00%	5.50
5a.	Grind ctg. angles & nose rad.	Per. Occ. .73 X 220 X 100.00%	160.60
4.	Tool aside	Per Occ. .03 X 220 X 100.00%	6.60
6.	Boring bar holder used:		
	a. Get holder & clamp tool	Per Occ. .17 X 220 X 4.60%	1.72
	b. Unclamp & aside	Per Occ. .08 X 220 X 4.60%	.81
7.	Get tool point	Per Occ. .81 X 220 X 1.80%	3.21
11.	Walk to comparator & ret. [.01 + (.003 x 10')]	X 220 X 10.00%	.88
8.	Insp. tool on comparator	Per Occ. .45 X 220 X 10.00%	9.90
9.	Wipe tool & ret. to table	Per Tool .13 X 220 X 100.00%	28.60
10.	Mark tally sheet	Per Occ. .03 X 220 X 100.00%	6.60
11.	Walk back to grinder [.01 + (.003 x 5')]	X X 100.00%	5.50
	Total Time for 220 Tools		599.91
	Average Time Per Tool		2.73

FIGURE 7

Carbide Tool Touch-Up Standard Data
Calculation of Per Tool Time
Tool Serviced From Window

Ele. No.	Element					Min.
11.	Walk to window [.01 + (.003 x 9')]		X 65 X 100	%		2.41
1a.	Get tool at window	Per Tool	.26 X 65 X 100	%		16.90
11.	Walk to grinder [.01 + (.003 X 3')]		X 65 X	57.1%		.71
2.	Clamp & Setup	Per Occ.	.55 X 65 X	57.1%		20.41
5c.	Grind rake angles	Per Occ.	.77 X 65 X	32.4%		16.21
5d.	Grind chip breaker	Per Occ.	.58 X 65 X	24.7%		9.31
11.	Walk to Excello [.01 + (.003 X 5')]		X 65 X	75.6%		1.28
5a.	Grind cutting angles & nose rad.	Per Occ.	.73 X 65 X	75.6%		35.87
5b.	Grind nose rad. only	Per Occ.	.16 X 65 X	6.2%		.64
6.	Boring bar holder used:					
	a. Get holder & clamp tool	Per Occ.	.17 X 65 X	13.8%		1.53
	b. Unclamp & aside	Per Occ.	.08 X 65 X	13.8%		.72
7.	Get tool print	Per Occ.	.81 X 65 X	1.5%		.79
11.	Walk to comp. & ret. [.01 + (.003 X 10')]		X 65 X	3.1%		.08
8.	Insp. tool on comparator	Per Occ.	.45 X 65 X	3.1%		.91
9.	Wipe tool & deliver to window	Per Tool	.13 X 65 X 100	%		8.45
10.	Mark tally sheet	Per Tool	.03 X 65 X 100	%		1.95
11.	Walk back to gdr [.01 + (.003 X 5')]		X 65 X 100	%		1.69
	Total Time for 65 Tools					119.86
	Average Time Per Tool					1.84

FIGURE 6

b. Unclamp and Aside Holder — Per. Occ. .08 min.
Includes time to obtain the correct size holder for the boring bar, to clamp the tool in the holder before grinding, unclamp the tool after grinding and returning the holder to its normal location.

7. Get Tool Print and Check Angles. — Per. Occ. .81 min.
Includes time to get the correct print binder, open the binder, remove the appropriate tool drawing, read and comprehend the drawing, and to return drawing and binder after use.

8. Inspect Tool on Comparator. — Per. Occ. .45 min.
Includes time to place the tool on the comparator table, adjust the table to the correct height for tool profile projection, position the shadow screen and to read the angle and/or radius involved.

9. Wipe Tool, Deliver or Dispose. — Per Tool .13 min.
Includes time to clean the tool after touch-up and return the tool to the operator or leave the tool in crib cart or box.

10. Mark Tally Sheet. — Per Tool .03 min.
Includes time to mark the tally sheet for recording the number of tools ground.

11. Walk Time. — Per Occ. .01+ (.003 min./foot)

Observation of Frequency of Elements

After the determination of standard elements and time values, a frequency chart must be made in order to apply the elements on a "Per Tool" basis. This can best be made by either sampling the tools as they come into the crib and/or by the occurrences observed and noted while the timestudies were being taken. (Figure 5)

An elemental breakdown is then written up to encompass all the work elements that could be involved in the touch-up of a tool or tools and by applying the per cent of occurrence as shown in Figure 5 a Per Tool time is derived. (Figures 6 and 7)

Apply standard personal and delay allowances to the minutes determined and calculate the standard hours per tool or per hundred tools, whichever will accommodate your timekeeping practices.

A simple tally sheet is then designed to facilitate the reporting of the number of tools worked on and the recording of any extraordinary down time.

With this type of incentive application, as with production employees, an occasional on-the-spot audit helps to see that the rules of the game are adhered to.

This the first of a four part series on standard time data. The following parts will cover application of time data to snagging, cylindrical, surface centerless grinding. Reprints of the complete series will be available upon completion of publication.

Observation of Frequency of Elements

Tool Source	Total Number of Tools Observed	Tool Angles Touched-Up								Miscellaneous Elements					
		Cutting & Nose Radius		Nose Radius Only		Rake Angles		Chip Breaker		Tool Print		Comparator		Boring Bar	
		No. Tools	%	No. Tools	%	No. Tools	%	No. Tools	%	Tools	%	Tools	%	Tools	%
Tools serviced from Window	65	49	75.6	4	6.2	21	32.4	16	24.7	1	1.5	2	3.1	9	13.8
Tools returned (See Note)	A. 50	50	100.0	-	-	25	50.0	40	80.0	See Below					
	B. 220			See A.	Above					4	1.8	22	10.0	10	4.6

Per cent of tools serviced from window:

(From Daily Tally Sheets) — Tools serviced from window 126/Day 28.9%; Tools returned 310/Day 71.1%

Note: Tools returned — A. 50 tools analyzed for grinding requirements.
B. 220 tools observed touched-up during time studies.

Figure 5. Carbide Tool Touch-Up Standard Data

CONTROLLING ABRASIVE COSTS

By CLEMENT F. BROWN*

A careful study of abrasive requirements—followed by practical inventory control and purchasing to specification—offers real opportunity for cost reduction.

● Few plants exist in which an "on-the-ball" engineer—familiar with grinding and finishing operations—could not step in and recommend changes to improve operation performance and reduce costs. In many plants, substantial savings result from reasonable efforts to control abrasive product costs in areas of operation, product specification, inventory and purchasing.

Let's examine a few of the more important reasons why abrasive products bear consideration in this light.

(1) Abrasive products are too frequently "taken for granted." A grinder throwing a shower of sparks bears witness to the removal of metal—the wheel must be doing "OK." This line of reasoning can sometimes condone an inefficient grinding operation.

(2) Smaller companies sometimes feel they can afford little or no staff attention to such a simple matter as grinding wheel selection. Requisitioning of abrasive products is erroneously considered an elementary matter that a storeroom clerk can handle.

(3) In some plants, floor operations—such as grinding welds, cleaning castings and other operations involving the use of portable grinders—are performed under conditions that make wheel selection by the worker difficult to control. This is especially true of jobbing operations on a variety of materials. All the more reason for selecting the best general-purpose abrasive product available.

(4) In localized multi-plant operations, abrasive products are sometimes requisitioned by each plant. Here order duplication results in tangible losses. Ordering quantities and delivery dates may not take full advantage of possible savings through maximum quantity discounts and controlled shipments.

In considering any control program, two steps must be taken in a logical order.

FIRST—Define the factors requiring control.

SECOND—Set-up the control procedures.

FACTORS IN ABRASIVE PRODUCT SELECTION

To illustrate this point, let's use grinding wheels as a subject. Practically any plant uses them. Grinding wheel usage in the average plant can be generally divided into three classifications, as follows:

I. PRODUCTION WHEELS These wheels are used solely or primarily in production operations. For machine grinding such major operations as cylindrical, centerless, surface, internal and thread grinding are good examples. In portable hand-grinding operations, these wheels are used for snagging and cleaning castings in the foundry, weld grinding and cleaning in fabricating plants and abrasive cut-off operations (both manual and machine).

II. SEMI-PRODUCTION WHEELS In this area uses overlap somewhat. Wheels for pedestal grinders offer a good example. In one instance a worker cleans castings or deburrs small parts; on another occasion the same wheel is used to dress a drill point or sharpen a cold chisel or similar tool.

III. MAINTENANCE AND TOOL ROOM GRINDING In this case, most wheels serve a specific purpose on one machine. Such operations include resharpening small cutting tools—drills, milling cutters, carbide tools, etc. Wheels are usually mounted on a grinder and remain in position through-out their life or until the nature of the operation changes.

Briefly, this covers the varied uses of grinding wheels. Other allied abrasive products—cloth belts, flexible sanding discs, cartridge rolls, wire brushes, etc.—could be considered in the same light. End use of the abrasive product—whether general or specific—is the initial factor for consideration. Jobbing shops—performing a variety of grinding operations—often favor general-purpose wheels. They can ill-afford large, expensive inventories of specific-purpose wheels. Conversely, mass producers seek the single best wheel for a given operation. They can usually afford to test and evaluate a series of wheels to select the best for a specific purpose.

After pinpointing the operation, wheel selection is the next step. To intelligently select a grinding

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wheel, 7 factors must be considered. Let's take a brief look at each of them. Note that the last 5 factors are elements of the standard grinding wheel symbol or marking.

(1) Wheel Shape — Several shapes are available, in the following general types:

a. Straight and cylinder wheels.
b. Cups (straight and flaring) and dished wheels.
c. Cone and plug wheels.
d. Depressed-center discs.
e. Cut-off wheels.
f. Mounted wheels—covering a wide variety of small wheels of various shapes.

(2) Wheel Size — Three basic dimensions to be considered—diameter, width (or length) and mounting hole (or spindle) size. Secondary dimensions describe amount of flare, recess, etc. Economically, larger wheels offer maximum advantage in terms of unit cost per usable cubic inch of abrasive material (see illustration). However, work size, work position (as it effects the fatigue of the operator in portable grinding), machine size and speed are all important factors effecting the final decision.

(3) Abrasive Type — Two man-made abrasives—aluminum oxide and silicon carbide—have "taken over" the field, leaving the natural abrasives (sandstone, emery and corundum) far behind. The costly diamond is the only natural abrasive that finds fairly wide industrial use. Of the manufactured abrasives, aluminum oxide is the tougher; silicon carbide the harder and more friable. Each excels in its own area. Aluminum oxide finds wide use in grinding high tensile ferrous metals as well as malleable iron and some tough non-ferrous metals. Silicon carbide gets the call for cast iron, low tensile non-ferrous metals and non-metallic materials (plastics, ceramics, glass, etc.).

4) Grain Size and Classification — Grain or grit size can be generally divided into four classifications:

a. Coarse (10 to 24 grit).
b. Medium (30 to 60 grit).
c. Fine (70 to 180 grit).
d. Very fine (220 to 600 grit).

Coarser grits result in a fast stock removal rate and a rough finish. The opposite is true of fine grits. Finer grit wheels also become clogged (or "loaded") reducing the cutting action.

(5) Grade — This term refers to wheel hardness. Grinding wheels are often referred to as hard or soft, defining the bond's tendency to hold the abrasive grains. In hard wheels, a large amount of bonding material surrounds individual grains —making it difficult for the grinding action to tear abrasive particles from the wheel. Hard wheels naturally last longer; however, cutting action is retarded until dull grains are torn loose, presenting new, sharp grains to the work. Just the opposite is true of soft wheels; breakdown is at a faster rate along with cutting action. Wheel hardness is indicated by an A to Z classification

In general, soft grade wheels are best for hard materials and vice versa. From the economy standpoint, a common mistake is to use wheels that are too hard. While the wheel lasts longer, the penalty is paid in man-hours (due to a slower metal removal rate). Dull, loaded wheels require frequent dressing and additional power to drive the wheel because of increased resistance.

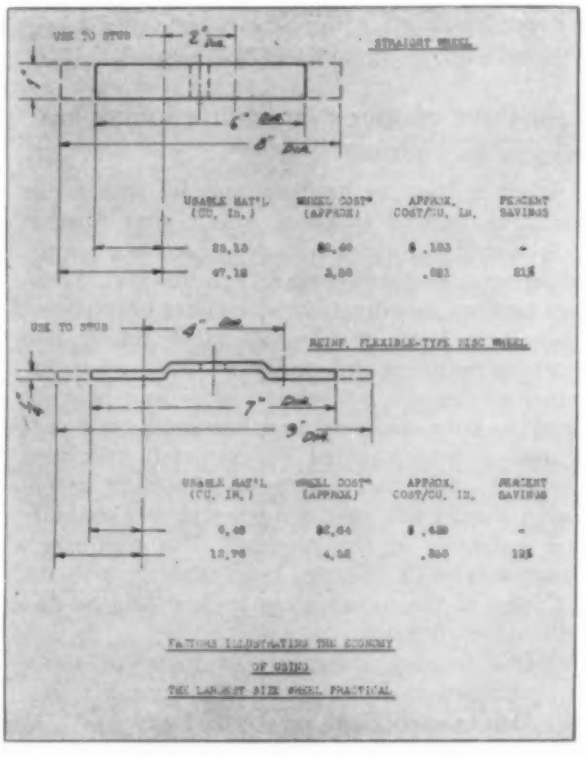
(6) Structure — Structure is grain spacing, ranging from dense to open. Open structures are usually associated with coarse grains, resulting in fast grinding and a rough cut. Dense structures and fine grits result in finer finishes at slower material removal rates. In the marking code, designation numbers run from 0 to 16 as follows:

a. Dense or close (0 to 3)
b. Medium (4 to 7)
c. Open or wide (8 to 16)

(7) Bond — Bond is the material part of the wheel that holds the abrasive grains together in a given shape. Six bonds are generally available; these are grouped in two categories as follows:

RIGID TYPES (Inorganic)	NON-RIGID OR ELASTIC TYPE (Organic)
Vitrified	Resinoid
Silicate	Rubber
Oxychloride	Shellac

Of these, 3 bonds find the major use today. About 50% of all grinding wheels made are of the vitrified bond type. Porous and rigid, wheels of this bond provide fast, economical stock removal. They are especially suited for precision machine grinding and other applications where work and wheel are both in fixed centerline positions. Vitrified wheels—operating at speeds up to 6500 surface feet per minute—are also used for low-speed snagging. Resinoid wheels can be run at greater speeds (up to 9500 sfm) and are usually powered



FACTORS ILLUSTRATING THE ECONOMY OF USING THE LARGEST SIZE WHEEL PRACTICAL

by portable hand grinders, swing grinders and similar equipment. They are used for heavy snagging operations on castings and weldments, weld grinding and cut-off operations. Operations of this nature are usually accompanied by severe and abusive grinding stresses and handling. This elastic-type wheel readily absorbs this rough treatment with safety. Rubber bonded wheels—both natural and synthetic types—usually take 3rd place in degree of use. In the softer types, rubber bonded wheels are excellent for polishing operations. The harder type—resilient and water-resistant—make excellent, cool-cutting cut-off wheels.

The accompanying chart on grinding wheel markings illustrates the general effect these various factors have on the grinding operation.

Once standard abrasive products have been selected, what are the problems of control? How can they be handled in a simple yet effective manner?

The Specification Sheet

After standard abrasive products have been selected, the matter of supply can become a routine function. As products are approved by line and staff, enter each in a specification book. A typical specification sheet form—filled out for a straight grinding wheel—is shown. Each factor previously discussed is shown on this sheet. In addition, the maximum safe operating speed is indicated. Space is also provided for recommended supply sources (by manufacturer and wheel marking). Number your "spec" sheets consecutively, starting at some arbitrary figure—such as 1000. Prefix this number by a coding letter to indicate the general nature of the product. Here's a suggested list of prefixes that are simple yet adequate:

G — all types of grinding wheels
C — cut-off wheels
B — brush type wheels (usually wire)
F — Flexible abrasive products—sanding discs, cloth belts, cartridge rolls, etc.

ABRASIVE PRODUCT CONTROL PROCEDURES

Program Responsibility

Select a man to head-up and be responsible for your control program. It's a good idea to have a staff industrial engineer (such as a manufacturing or methods engineer) in this spot. Abrasive product investigations sometimes prove time-consuming. Data, graphs and other information must be prepared and evaluated. Even when detailed studies are not warranted, liaison between abrasive sales engineers and line production personnel is best handled by the staff specialist. However, this does not mean that line supervision should not have a degree of responsibility and authority in the program. The staff man's function is best performed in an advisory capacity.

Copies of the specification book should be distributed as follows:

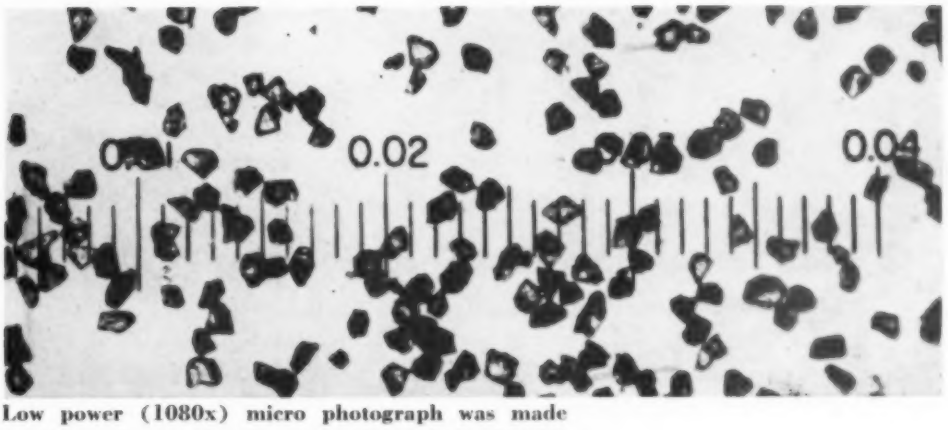
(a) One to each storeroom or toolroom where abrasive products are stored and requisitioned.
(b) One to each plant superintendent.
(c) One to the purchasing department.
(d) One for the staff engineer. This can be the master book, where each spec sheet is a tracing from which copies can be made.

Departmental Functions in the Control Program

1. Staff engineer—Working closely with the plant superintendent and line supervisors, recognizes the need for new and improved abrasive products; selects, tests and evaluates same (working with supplier's sales engineers). Makes up and revises specification sheets as new standards are approved and is responsible for issuing spec books and general administration of the control program.
2. Plant Superintendent—Should be responsible for final approval and acceptance of all products before they are finally listed as standards. Approves all storeroom requisitions for standard abrasive products as well as special purpose or non-standard products that may be required from time to time. Help may be requested from the staff engineer to evaluate special purpose products.
3. Storeroom or Toolroom Attendant—Requisitions abrasive products as stock supplies approach minimum quantities. This is done using company's standard requisition form by merely indicating the product to be ordered by the assigned spec number (for example, "G-1001 Wheel"). Note: If supplies are handled on an inventory control basis, cards indicating stock used are made out as abrasive products are issued for use. Using this system, requisitions are not required. The store-keeper also fills out —based on "on-the-shelf" supplies—monthly inventory sheets (see sample form) as required by purchasing or inventory control.
4. Purchasing Agent—Selects manufacturers and vendors supplying products complying with specification standards. Here again, the staff engineer may be called upon for recommendations. Guided by monthly inventory records, decides maximum economical quantities to purchase. (Note: Once vendors and ordering quantities are stipulated, inventory control may handle the routine work of the purchasing agent.) The accompanying table illustrates generally how ordering quantities effect the net cost of abrasive products. Of course, the economy of ordering maximum quantities must be considered on the basis of usage as related to the time large amounts of capital may be tied up. Arrangements can be made with most suppliers to order maximum quantities, spacing out periodic partial deliveries and payments over a reasonable time (usually about 6 months—sometimes longer).

These procedures as outlined have been used successfully to control abrasive product costs in a medium size, dual plant operation. Functions and responsibilities may have to be combined or sub-divided to suit organization size and make-up.

• • •



Low power (1080x) micro photograph was made to give a better visual presentation of the blockiness and uniformity of size than can be obtained with man-made powders. Each division on scale represents approximately 21.15 microns.

Man-Made Vs. Natural Diamond Powders

Both in preparation and use, man-made diamonds prove superior to natural diamonds for the micron size particles used in diamond powders.

By STANLEY KAY and EDWIN F. WARREN
Kay & Warren Company

● This report covers diamond powders in the micron range of 0-2 micron, up to 30-60 microns. To date industry has only been informed on the comparison of man-made and natural diamonds in the coarser grit sizes used in diamond wheels. It should be noted that this report again points up the importance of friability of the man-made diamond in the areas where friability of the diamond products is advantageous to the operation.

The use of man-made diamonds in micron size powder is exemplified by the experimental uses conducted at Superior Tube Company, Norristown, Penna. E. W. Maul said the tests were performed in their die shop on dies and mandrels using grades 15, 30 and 45. The test covered 1981 dies, a normal amount of work for one operator, and the following reasons were given as to why they found man-made diamonds equivalent or in some cases superior to natural diamonds.

During the working of the dies with man-made diamonds 10 grams less compound was used. The rough grades cut as well as natural while giving a better finish. This finish was from 3 to 7 microinch which was equivalent to finishes obtained from previous compounds thus eliminating much of the polishing in the finer grades. Still another advantage was that the man-made diamond compound did not separate when left standing, therefore, it gave constant cutting action throughout its use.

In the preparation of man-made powder an analysis showed the powder to be 99.5% pure with traces of what appeared to be graphite being noted. The ash left in the combustion boat appearing to be iron oxide.

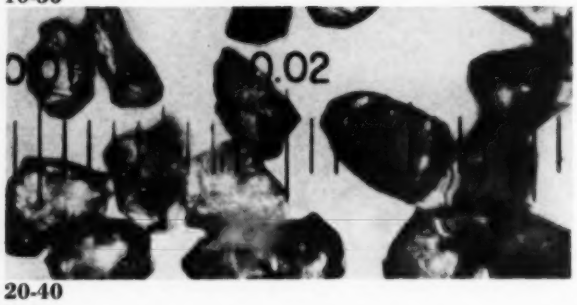
Ball milling of 1000 carats of man-made minus 325 mesh and 1000 carats of natural minus 400 mesh were subjected to the same length of time and conditioning, resulting in the man-made diamonds producing approximately 10% more superfines of 0-2 microns. They contained very little of the 30-60 micron range whereas the natural which started one mesh finer contained quite a bit in this coarser range. As noted at the beginning of this article the friability of man-made is a real advantage. After ball milling it was noted that man-made diamonds had a better particle shape as it was blockier and with complete absence of panes and slivers. Natural diamond requires more time and effort to produce a similar particle shape. This also reflects the difference in friability between natural and man-made diamonds.

Man-made diamonds definitely lend themselves to micronization and grading. In grading we are able to perform "one-shot" runs on man-made diamonds with very successful results. The photos with this article are examples of this grading.

6-12

10-20

10-30



20-40

Samples of graded man-made diamond powders have been submitted to a cross-section of industry. Superior Tube Company was one of the companies contacted. Results were to prove that on diamond dies, man-made powders did not cut fast enough to be profitable and required the use of too much powder; the results produced however, were equal to natural diamonds. Used on carbides, man-made diamond powder is as good as natural. Used on steels where tooling agents ranged from brushes felt buffs, laminated wood to cast iron, cutting action was identical. Also revealed was an unusual trait of man-made diamonds to be attracted by an ordinary magnet. This may be of some unforeseen value in the future.

We would like to warn the reader not to overdramatize the lack of tenacity of man-made diamonds as presaged by our ball milling operation and later noted in the most rigorous operation of diamond against diamond with the use of a hard tooling agent, the steel needle. This was the only operation where man-made diamonds did not stand up to natural diamonds.

We feel the manufacturing of artificial diamonds to be one of the most practical scientific advances made in the past decade and predict that man-made diamond will eventually replace natural diamond as the abrasive of the future. According to present trends price rather than shortage or national emergency factors will promote large scale use of man-made diamond powders in this country. • • •

This series of photos show the man-made diamond powder under 4680x power with each division representing approximately 5 microns. The numbers under each photo represents the micron range of the particles. These photos show the results of "one-shot" grading.

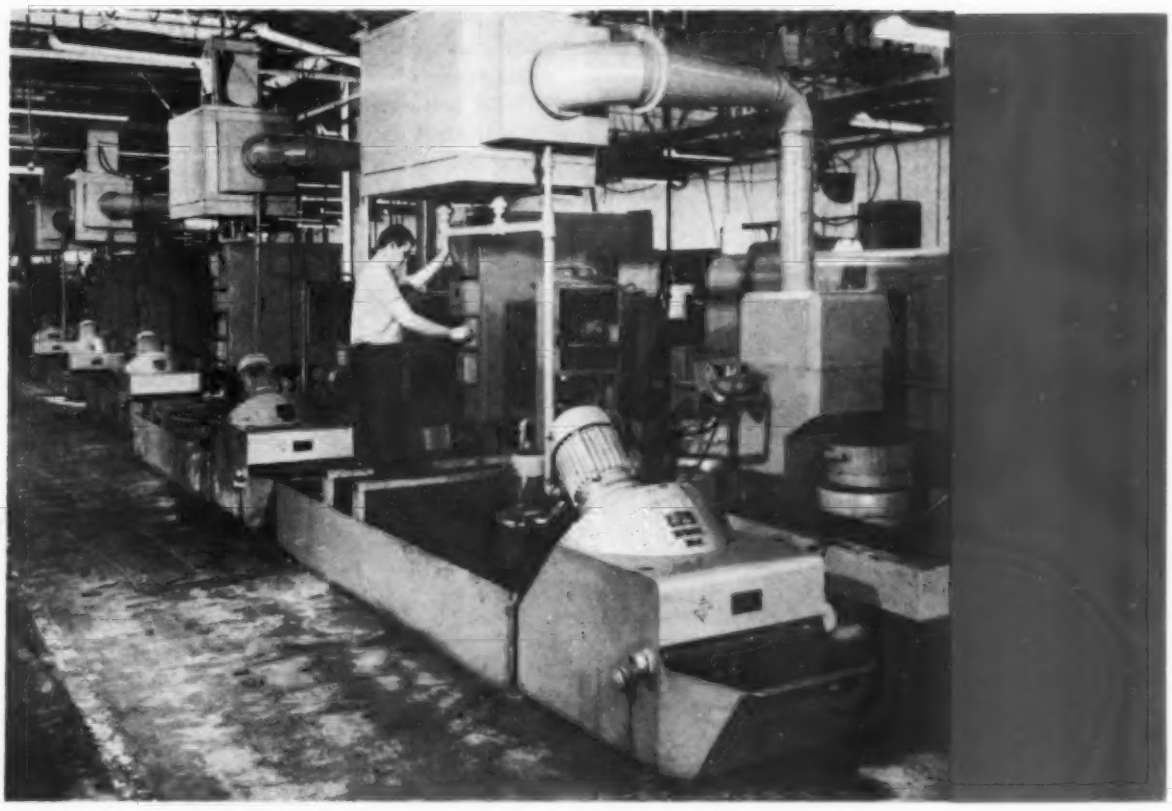
Micromatic Hone Corp. "Keeping Pace With Progress"

● Microhoning of ball studs, raceways, flats and horizontally stacked parts, new line of cylindrical, surface and toolroom grinders, new Carbond honing abrasive, multiple channel recorder for experimental and new self-lubricating bearings were the points stressed at the recent Micromatic Hone Corporation exhibit. Very aptly entitled "Keeping Pace With Progress" the exhibit was started with a speech by Don Connor, President. Connor's speech set the pace by explaining that progress resulted from ideas to produce better products at less cost.

Equipment of particular interest to us was the new Carbond honing abrasive which is extremely dense, stacked horizontal honing for rocker arms, spherical honing of ball studs, ball track honing, the line of Jones-Shipman grinding machines and the biggest event of all, in-process measuring for experimental work on honing by a multiple channel recorder. This recorder is one of the few which are being used in industry for machine evaluation.

Current studies with the use of the recorder have already had their affect on honing. The study concerned stock removal. The results in a Micromatic customer's plant was the removal of .090″ from the 6″ diameter of 32″ long (75″ C″) at the rate of .003″ per minute.

The use and results of the multiple channel recorder is one example of Micromatic's "Keeping Pace With Progress." • • •



Five DeLaval TurboMatic Coolant Clarifiers coupled to Ex-Cell-O grinders are used to clarify coolant used in grinding turbine blades for jet engines.

Coolant Clarifier

Eliminates All Scratching

At Lycoming

Efficiency increased 39% and costs were cut by a new centrifugal coolant clarifier. All the scratches from the grinding of jet turbine blades were eliminated.

● First installation in the United States of a new high-capacity centrifugal coolant clarifier has resulted in a 39 per cent increase in clarification and lowered operation and maintenance costs for Avco Corporation's Lycoming Division.

Lycoming uses the "TurboMatic," developed by De Laval Separator Co. Poughkeepsie, N.Y., at its Stratford, Conn. plant, to clarify coolant used in the grinding of turbine blades for jet engines.

The blades are made from 403 (nonmagnetic) stainless steel and require a first class finish with tolerances held to 0.0005".

Machine tools on which coolant clarifier is coupled are Model 85 Excello Grinders having a nominal coolant flow of 40 gpm.

Lycoming found abrasive material that remained in recirculated coolant even after filtering caused scratching.

To solve the problem, Lycoming became the first to install the newly-developed "TurboMatic." The company put one machine in operation as a test model.

Results were beyond expectations. The TurboMatic operated at 99 per cent efficiency, and separated micron-sized contaminants as well as large abrasive material.

According to E. J. Seitz, Lycoming's lubrication engineer, "because of the present quality of the recirculating coolant, all scratching has been eliminated."

Sludge is removed once a week by means of a perforated rake. This takes about one minute. Sludge removal from filters took each of two men eight hours once a month.

Another advantage is elimination of wear in the coolant circulating pumps. Previously, abrasive material remaining in the coolant caused so much damage that it was necessary to repair the pumps every six to eight weeks. There has been no pump repair since installation of the TurboMatic.

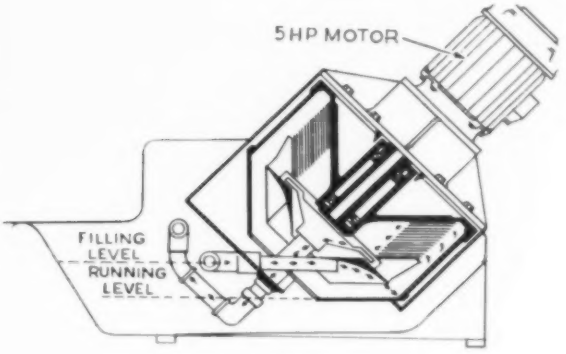
Because of the results obtained with the pilot model, four additional TurboMatics were installed on the production line.

With increased missile activity, space is at a premium at the Stratford plant. Installation of the TurboMatic helped free valuable area for other operations. The TurboMatic is about 3 feet wide by 4 feet long and 3 feet two inches high.

Another advantage was cleaning. Under the old system, sludge was removed every month. This took two men eight hours. The TurboMatic requires no such maintenance and at Lycoming, a week's accumulation of sludge is removed in one minute with a perforated rake.

Centrifugal force is fully utilized in the TurboMatic by means of conical discs in the centrifuge which divides the liquid into many thin layers. Extracted solids are purged twice per shift from a high capacity bowl. This is done by operating a reversing current switch that brakes the machine to a full stop in eight to ten seconds.

Rapid braking action coupled with the bowl's operating at a 45° angle causes accumulated sludge to fall into a sump provided at the bottom of the machine without the need for any mechanical scraper.



De Laval "TurboMatic" Coolant Clari

A 5 hp motor is used. Operating on 440 volts, the motor has a full load rating of 7.5 amps.

The TurboMatic is provided with inlet and outlet connections on both sides so it is easily coupled to a multiple installation.

According to Mr. Seitz, Lycoming has had no mechanical trouble with any of the TurboMatics and the company is planning future installations. • • •

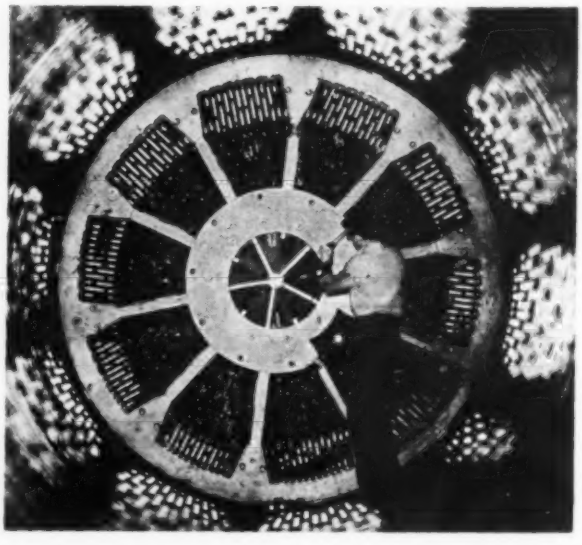
Ball Grinding Mill Part Resembles Wheel

● It looks like a gigantic wheel of fortune, but it is actually a division head, part of a ball grinding mill, being tightened at the West Allis (Wis.) Works of Allis-Chalmers.

The division head is part of a 10′ diameter by 34′ long mill that A-C is manufacturing for the Louisville Cement Company, Speed, Indiana. It is used to divide the mill length into compartments that hold various sizes of forged steel grinding balls.

Slots in the division heads permit the cement raw material to pass to succeeding compartments when the material is ground small enough, but retain the grinding media in their respective compartments.

Division head grates are cast of .60 per cent carbon, chrome moly steel. • • •



Finishes without Removing Metal

The Mica Corporation found the use of Flex-Drum sander gave the desired finish they required on their copper-clad laminates while at the same time not removing or cutting through the thin copper foil regardless of the thickness of the foil.

Special to **GRINDING** and **FINISHING**

● The largest manufacturer of copper-clad laminates for printed circuits in Southern California is The Mica Corporation of Culver City. Electrolytic copper foil of various weights is laminated under heat and pressure with multiple layers of epoxy resin impregnated glass fabric. This process yields a laminate that exhibits excellent electrical and structural properties and a very high copper-to-laminate bond strength. The copper bond withstands the high (500°F) temperatures used for dip soldering without blistering or delaminating. The copper is bonded to either one or both sides of the laminate and the laminates are manufactured in standard thicknesses from .004 to .50 inch.

Particular care has been taken to maintain the original finish of the copper surfaces, which historically have required only normal processing before use. In order to provide a more pleasing appearance, a perfectly clean, "toothed" surface for subsequent solder-bonding, and to reduce the surface processing before use to a minimum, The Mica Corporation has installed a "refinishing" operation. The copper-clad laminates are put through a machine equipped with a special abrasive-leaf drum which revolves at 1200 rpm and oscillates from side to side enough to blend out any streaking as it makes a pass over the laminate. Finishes are uniform over the entire surface.

The amount of material removed, even with several passes, is so slight that it is impossible to measure the thickness change with ordinary micrometers. Regardless of the thickness of foil used, there is no danger of the abrasive cutting through. Owen Johnson, Director of Manufacturing at Mica Corporation, calls the operation a "surface phenomenon," rather than a material removing process.

A Merit Flex-Drum Sander at Mica Corporation, Culver City, California, cleans and polishes copper-clad laminated panels used for printed circuits for the electronic industry. The 24-inch abrasive drum produces a uniform finish over the entire surface in one pass through the machine.

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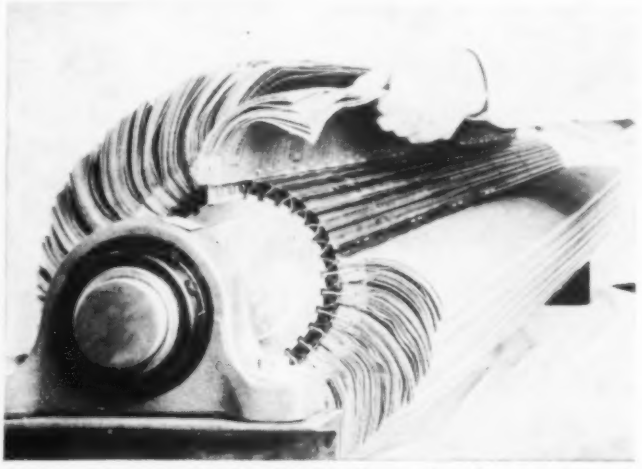
Known commercially as the Merit Flex-Drum, this tool consists of a series of "leaves" of abrasive cloth mounted horizontally to a cylindrical mandrel or wheel. As the mandrel rotates it wipes the leaves in rapid succession over the surface of the laminate. The mandrel itself is mounted on arbors so that a slight oscillating motion from side to side can be provided. Its construction consists of many horizontal key slots into each of which is inserted a steel ferrule holding several strips of coated abrasive. The abrasive loadings can be changed in a matter of minutes, using only a screwdriver. The wheel need not be removed from its mounting to load or change grit.



Construction of the Merit Flex-Drum Sander consists of replaceable segments of abrasive cloth strips. The one-piece design eliminates any parting lines or ridges on polished surfaces. Wheel can be reloaded within 15 minutes without removing it from its arbors.

The one-piece design of the Merit Flex-Drum leaves no parting lines such as is the case when flap wheels are ganged on a single spindle. The abrasive of the Flex-Drum cleans itself by centrifugal force and will not clog or load up even when very soft metals are finished. The Flex-Drum is provided in a wide range of grits from No. 40 to No. 320 and in widths up to 60 inches. It has been particularly successful for satin finishing aluminum and stainless steel. Because of its flexibility, contoured parts can be handled equally as well as flat, broad surfaces. The wheels in smaller widths (up to 8 inches wide) may be had with "slashed" abrasive cloth for greater flexibility when used with irregular and odd-shaped parts.

The abrasive cloth wears evenly and a fresh cutting edge is always in contact with the work. Back-up pressure is furnished by the compactness of the flaps themselves. The Flex-Drum is particularly adaptable to long production runs and one abrasive loading will last for hundreds of hours of normal refinishing. This equipment is manufactured by Merit Products of Los Angeles, California.

Johnson points out that former methods of achieving a refinished surface included hand work with steel wool or scouring cleansers, and wet process machines. "We experimented with several techniques," he states, "before deciding on the Flex-Drum. It answers our problem better than anything we have tried. It has practically eliminated manual operations and has thus cut our refinishing costs to a fraction." • • •

Book Review

KILLER AMONG US

By ROBERT MARTIN

We think you will really like this book. We found it to be one of very few books which once started just had to be finished.

Reading Robert Martin's *Killer Among Us* was like taking a busman's holiday. Martin, who is one of us by virtue of being the personnel manager of Sterling Grinding Wheel Co., has utilized all the excitement of the grinding wheel industry plus the suspense of the private detective. The story starts in a grinding wheel plant and involves the death of a snagging operator. Anyone who has had anything at all to do with abrasives will find this book extremely enjoyable. From Dodd, Mead & Company, 432 4th Ave., New York 16, N.Y. $2.95.

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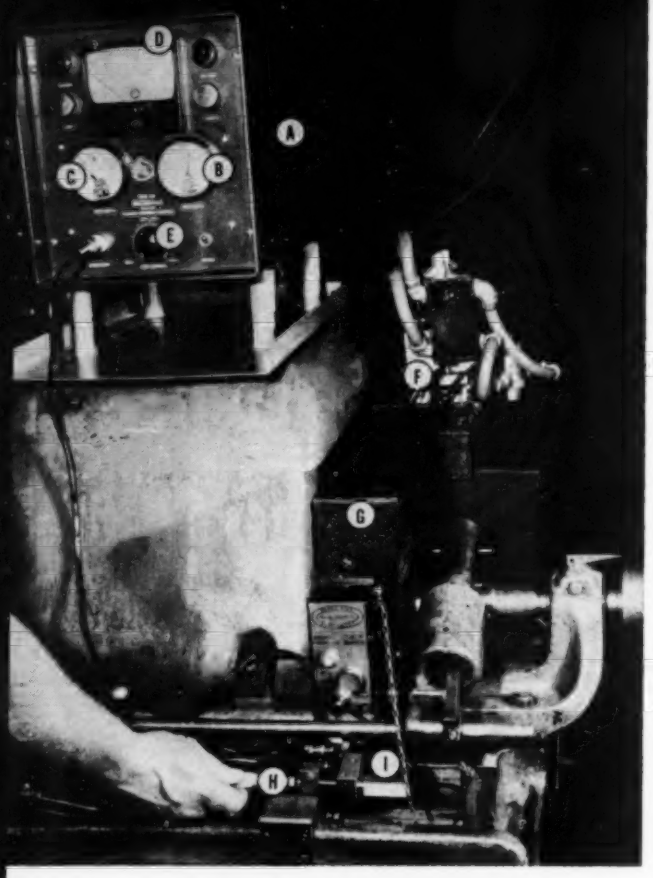

INFEED CONTROL FOR CENTERLESS GRINDERS

Higher production rates and closer piece-part tolerances for infeed centerless grinding have resulted in careful study and development of a new method of infeed control.

Figure 1. Bel-Air Infeed Control System. A "Microtrol" type 150 Electronic control unit. B-Limit B meter. C-Limit A meter. D-On size meter. E-Size control knob. F-Feed rate control valves. G-BGF-5B power feed unit. H-Micrometer coarse adjust. I-"Microtrol" type 150 transducer head.

By PHILIP OHRINGER*
Airborne Instruments Laboratory
Division of Cutler-Hammer, Inc.

● The increased demands on the infeed centerless grinding field for higher production rates and closer piece-part tolerances have resulted in the acceptance of costly stop-gap procedures —that is, overworking available machinery to meet the demands.

Airborne Instruments Laboratory (AIL) and Bellows Company have combined their engineering skill to develop a control method for infeeding centerless grinders that overcomes most of these problems. To appreciate the simplicity, yet effectiveness, of this system it is necessary to understand the production problems encountered when infeed methods are used to grind parts to close output tolerances.

A centerless grinder consists of a grinding wheel to remove material from the work, a regulating wheel to rotate the work, and a workrest blade to support the work between the wheels. The faces of the wheels are parallel, and in most centerless grinders the grinding wheel is fixed and the regulating wheel translates. Two slides are used to adjust the regulating wheel to the workrest blade and to the grinding wheel. The regulating wheel is attached to the upper slide and the workrest blade to the lower slide. The relationship between the regulating wheel and the workrest blade is adjusted for the particular diameter of work being ground, and fixed by locking the two slides together. To grind the outside diameter of the work, the regulating wheel and the workrest blade are usually moved together in respect to the grinding wheel.

A typical infeed grinding cycle consists of placing a part to be ground on the workrest blade, and moving the slides toward the grinding wheel at a rapid rate. Just before the work makes contact with the grinding wheel, the slide is slowed to a grinding rate. This rate, or a succession of slower feed rates, is used until the end position is reached. The slides are retracted, the part removed, and the cycle repeated.

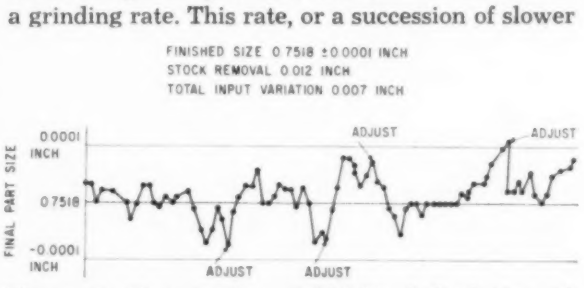

Figure 3. Test results of Bel-Air Infeed Control System by an independent manufacturer.

The optimum tolerance that a machine tool can produce parts to is called the machine scatter (Figure 2)—that is, the variation in the output part-size, from part to part, when the elements of the machine that determines part-size are brought into the same exact relationship with one another.

A centerless grinder, in good condition, has a machine scatter of about 30 millionths of an inch. This is mainly caused by machine vibration.

Figure 2 shows that during a grinding operation there are thermal trends and wheel break-

*From a paper presented at the 11th Annual AIEE Machine Tool Conference, October 20, 1959.

Grinding and Finishing

DECEMBER, 1959

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EQUIPMENT & LITERATURE ITEMS

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Grinding and Finishing

DECEMBER, 1959

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EQUIPMENT & LITERATURE ITEMS

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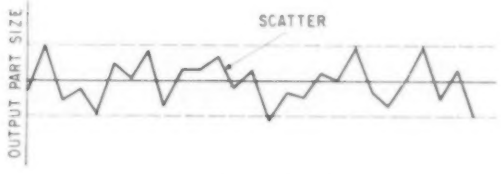
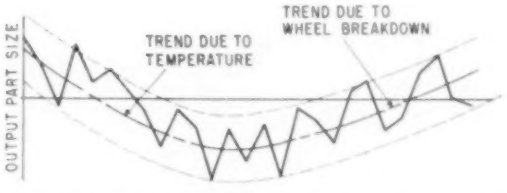
down trends. Wheel breakdown causes an increase in part size. Temperature trends usually cause undersize parts. Since the *major determinant of output part size is the relative distance between the wheels* at the end of the infeed grinding operation, it is common practice to change the end position of the slide to compensate for these tendencies. The minimum amount of end position adjustment and its controllability are important factors in determining the closest output tolerance that parts can be ground to. The condition of the machine and the ability to which trends can be ascertained also determine the overall output tolerance. Other important factors are the amount of time the work is left between the wheels at the end of the grinding cycle (dwell) and the grinding rate. The longer the dwell time the smaller the output part size will be. (During dwell, there is no direct translation of the slides. However, material is still ground away since the machine parts that had been under stress tend to move the wheels close together as the stress is removed.) Increasing the grinding rate causes the work to heat and expand. An additional amount of material is removed due to this expansion This results in undersize parts when the work cools. There are numerous other factors that affect final part size, but these are the most important.



A. VARIATIONS DUE TO MACHINE SCATTER



B. VARIATIONS DUE TO TEMPERATURE AND WHEEL BREAKDOWN TRENDS

Figure 2. Machine scatter and trends

The Bel-Air Infeed Control System (Figure 1) sold by the Bellows Company is a control-method for infeeding centerless grinders that overcomes many of the problems encountered in production grinding. The end position of the slide can be repeated regardless of variations in input part-size, and parts can be ground to a tolerance approaching the machine's capability.

The system consists of four major components:

1. MICROtrol 150 transducer head
2. MICROtrol 150 electronic control unit
3. Micrometer head coarse adjust
4. Bellows BGF-5B Power Feed Unit

When it is necessary to correct for temperature or wheel-breakdown, trends, adjustment is obtained by rotating the SIZE CONTROL knob on the front panel. This changes the voltage level within the unit. With this control it is possible to electronically change the final slide position by as little as 25 millionths of an inch. An important feature of this control is that it simultaneously shifts all the feed rate switchover points with the stopping point. This prevents the possibility of slamming the work at the beginning of the infeed cycle, since all of the original settings with respect to the stopping point are maintained. The total range of this control is 0.004 inch. Another adjustment for size is provided by the micrometer head. It serves as a long-range coarse adjustment and is used only during initial setup, or after dressing-down of the grinding wheel.

After the feed rates and switchover points have been selected, the operating cycle of this system is:

1. The work is placed on the workrest blade.
2. The slide is moved toward the grinding wheel at its fastest rate—rapid feed.
3. Just before the work contacts the grinding wheel, the Limit B meter in the electronic control unit signals the infeed mechanism to reduce the slide velocity to a slower rate—grinding feed.
4. The infeed mechanism continues to move the slide at this rate until the Limit A meter signals the infeed mechanism to reduce the speed of the slide to a still slower rate—fine feed.
5. The slide continues to carry the work against the grinding wheel at fine feed rate until the desired final position of the slide is reached. At this point the On Size meter sends a signal to the infeed mechanism to stop the slide and retract. (The signal to retract may be delayed in the electronic timer to obtain a dwell period, if desired.)

This method of infeed centerless grinding is extraordinarily effective in repeating slide position regardless of input part size variation. In doing so the major cause of output variation is greatly reduced.

Typical data submitted to us by a prominent bearing manufacturer are shown in Figure 3. The data was obtained from tests conducted by their quality control department and was taken during one of their normal production runs. The final part size required was 0.7518 $\pm$ 0.0001 inch, the input part size variation was 0.007 inch, and the total stock removed was 0.012 inch. The operator corrected for size using the Size Control knob whenever he believed it was necessary. From the graph it is clear that the operator has no trouble maintaining this tolerance. Data received from other reputable manufacturing plants confirm the above results. • • •

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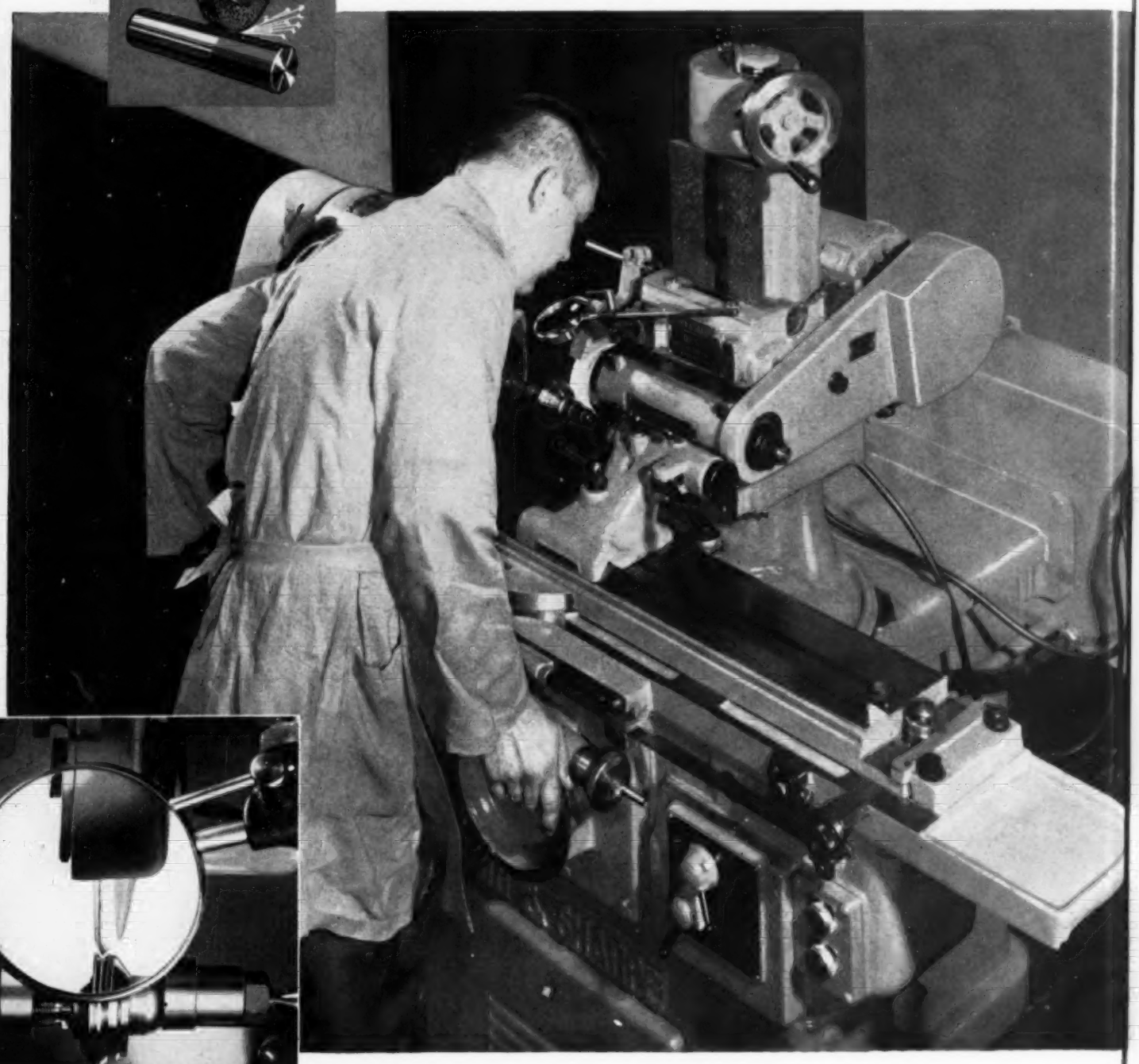

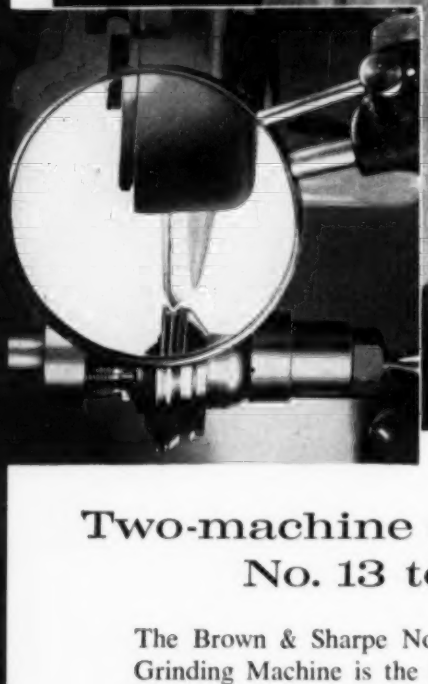

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For details, write: Machine Tool Division, Brown & Sharpe Mfg. Co., Providence 1, Rhode Island.

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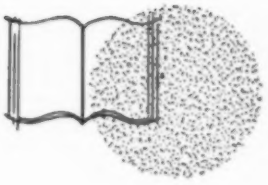


Literature

1. Diamond Tools. A new loose-leaf catalog containing sketches of standard diamond tools, a guide to the selection of tools, and hints on their care and use. Additional sheets are sent out from time to time to supplement or replace the originals. A design service is also offered for making special tools to order. New York Diamond Tool Co., Inc.

2. Caliper-type Grinding Gages. Catalog 59A describes the complete line of Arnold Continuous Grinding Gages, equipped with Federal indicators, and sold by Federal Products Corp. Featured in the publication are the new Model SG for grinding parts under ½" in diameter, the king-size Model LG, for work 20" to 30" O.D. and a new Model I for internal grinding. A new ball-bearing mounting is also described. Federal Products Corp., Providence, Rhode Island.

3. Porcelain Strainer. A data sheet describing a new all-porcelain strainer designed to remove both coarse and fine solids before they enter chemical pumps, valves or other process equipment is now available. The strainer element, of fused porcelain and easily removable for cleaning, comes in three ranges of pore diameters. The coarse element has an average pore diameter of 250 microns; the medium, 150 microns; and the fine, 110 microns. Lapp Insulator Company, Process Equipment Division, LeRoy, New York.

4. Grinding Wheel Data File. Recommendations for Portable Offhand Grinding, Bulletin EB-505, is one of several included in an engineering data file from Chicago Wheel & Mfg. Co. Others available in the file are Bulletin 1505, Mounted Wheel Catalog; Bulletin S-90, Slide Abrader Brochure; Bulletin F-80, Metal Fabricating and Foundry Guide; and Bulletin 7525, Grinding Wheel Catalog. Chicago Wheel & Mfg. Co., Chicago, Illinois.

5. Safety Glasses. A complete new catalog No. S-8582, covering AO's entire Ultrascopic Safety Glasses line is now available. The four series described—Safemaster, Mahogany, pink crystal and metal frames—are said to total over 450 goggles. The catalog is punched for standard binders. American Optical Company, Safety Products Division, Southbridge, Massachusetts.

6. Plug and Ring Gages. A three-color gate-fold flier printed on cardboard contains data about Econ-O-Chek gages. Included is information about taperlock thread plug gages, thread ring gages, thread setting plugs, reversible thread plug gages and plain cylindrical plug and ring gages. Reliant Gage & Supply Co., Los Angeles, California.

(See Number 1)

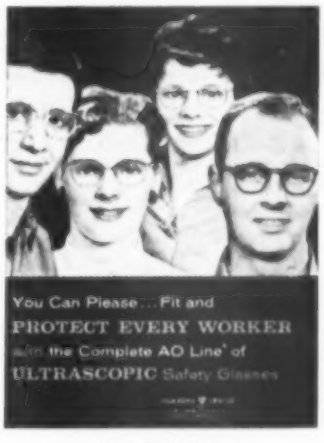
(See Number 4)

(See Number 7)

7. Precision Thread and Cylindrical Gages. A 22-page illustrated catalog of thread and cylindrical gages is now available. The publication includes data on both standard and special instruments, in steel, carbide or Lincaloy chrome. The company's reworking program is also described, together with hints on the care and use of precision gages. Lincoln Gage Company, St. Clair Shores, Michigan.

8. Carbide Burrs. A new twelve-page catalog describes a complete line of solid-carbide burrs for use with power hand tools and flexible-shaft machines for cutting metals, plastics and other materials. Catalog CB-59 pictures and describes 14 different solid carbide burrs, and includes selection and application information together with tables of sizes and prices. Thomas C. Wilson, Inc., Long Island City, New York.

9. Precision Surface Plates. Two fliers describing a line of black granite surface plates are now being distributed. Made from "black granite" (technically described as gabbro or diabase), the plates are said to be stiffer, less porous and more wear-resistant than those made from granite. Both standard two-ledge and special four-ledge plates are manufactured, and a refinishing service is offered. Accu-Rite Surface Plate Company, Los Angeles, Calif.



(See Number 5)

To obtain literature use Reader Service cards on page 43. Circle on the card the number which appears at the start of the paragraph describing the literature you request.

FREE LITERATURE *continued*

10. Chips. The fall issue of this Brown & Sharpe publication contains an article about "Orbit," a new organized replacement service; another about training and opportunities for toolmakers and a third about local cutter grinding services to factory standards. Brown & Sharpe Manufacturing Company, Providence, Rhode Island.

11. Portable Crankshaft Grinder. An eight-page flier punched for three-ring binder, No. X-KN-5001A, describes Sunnens precision portable crankshaft grinder. The unit may be mounted on a lathe, or temporarily attached to the frame of the car or truck. Accessories and replacement parts are also described and illustrated. Sunnen Products Company, St. Louis, Missouri.

12. Tool Tips. The October issue of this Ex-Cell-O publication features a spread on internal grinding of inner and outer races for miniature bearings on the Bryant Model B Miniature Centalign. Capacity of the machine is .6250" maximum O.D. of work-piece. Ex-Cell-O Corporation, Detroit, Michigan.

13. Electrically-Aided Tool Grinding. A pocket-sized booklet gives instructions and suggestions for better operation of electrically-aided tool grinders. Items are subdivided into four categories; General; Off-Hand or Face Wheel Grinding; Chip-breaker Grinding; and Service Instructions. Bulletin No. OC-759. Anocut Engineering Company, Chicago, Illinois.

14. Wheel Forming Attachment. A four-page two-color flier, Circular No. 621, describes Pratt & Whitney's new attachment for shaping wheels for form grinding. It is claimed that the unit will reproduce on a grinding wheel complex contours accurate to "tenths" in minutes. Advantages and features of the Diaform attachment are detailed, and specifications and standard equipment are listed. Pratt & Whitney, West Hartford, Conn.

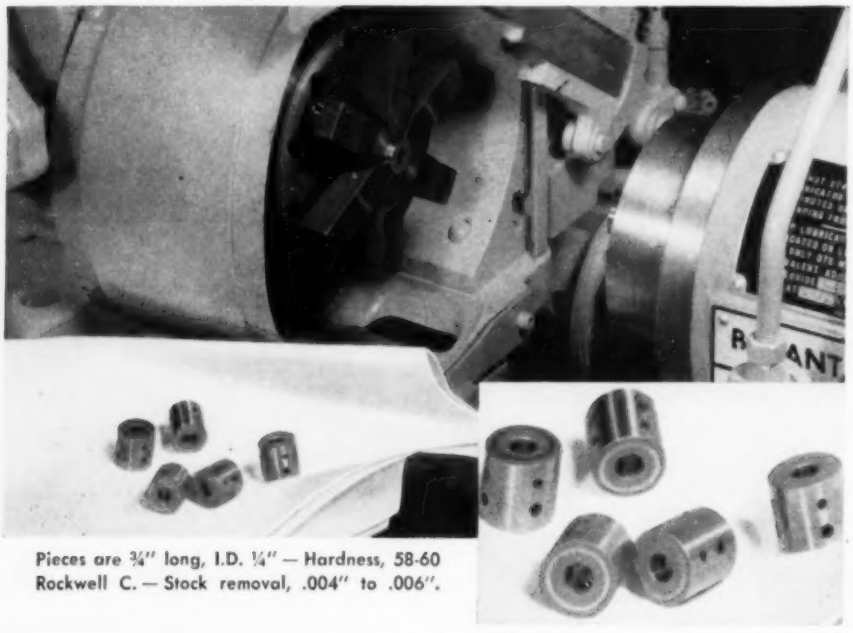
15. Safety Recommendations for Grinding Wheel Operation. Booklet prepared by the Safety Committee of the Grinding Wheel Institute especially for the use of grinding machine operators, foremen, supervisors and others responsible for the control of grinding wheel speeds. The recommendations are the result of the collective experience of the Institute members, and are in conformance with the provisions of the ASA Safety Code B7.1-1956. The booklet discusses the relationship of wheel speed to efficiency, points out cases in which reduction of speed was not only safer but also more efficient. The Grinding Wheel Institute, Cleveland, Ohio.

(See Number 10)

16. Optical Flats. A new price list and data bulletin illustrates an increased size range as well as optical flats with holes, coatings and parallels. Many of the standard prices are claimed to be lower on this new price list. Price list OF8-59. Acme Scientific Company, Chicago, Illinois.

17. Physical Sciences. A new 112-page catalog containing specifications for over 300 exclusive products used in the physical sciences has been issued by The Ealing Corporation, a Baird-Atomic Affiliate. Items described range from optical benches to electron impact tubes. Through a plan of special supplements to users, the catalog will be kept current on a quarterly basis. The Ealing Corp., Cambridge, Massachusetts.

18. Diamond Tools. A flier describing Turnable diamond tools is now available from Cleveland Industrial Tool Co. Made



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W&B "1500" will help you too, in jobs as tricky as this or in routine production . . . yet costs as little as 1¢ per gallon of coolant! The foamless, transparent mix keeps wheels open, settles chips fast and provides excellent rust-protection. Send for complete information on amazing W&B "1500".

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with a hardened steel shank and a beryllium copper head, the tool is said to simplify turning the diamond, lengthening life of diamond and wheel and permitting the use of smaller diamonds. Cleveland Industrial Tool Co., Chardon, Ohio.

19. Abrasive Belt Grinders. A four-page combination flier and specification sheet, punched for a three-hole binder, describes abrasive belt grinders. Both bench and floor models are included. The machines are equipped for off-hand grinding on a contact wheel, platen, or slack-of-belt. Complete specifications for belt size and speed, contact wheel dimensions and hardness, and other components are included. Burr-King Mfg. Co., El Monte, California.

20. Jig and Fixture Components. A new catalog of jig and fixture components, of interest especially to designers, tool engineers and production executives for tooling programs, includes removable flat sheets of tracing templets—approximately 490 drawings, with over 90% in full size. All templets are printed in red ink. A helpful feature is the front cover with a visual index to aid in part selection. Catalog No. CP-101. Standard Parts Company, Bedford, Ohio.

(See Number 20)

21. Precision Chucks. Amusing four-page folder describing the development of a chuck for a precision internal grinding operation on a missile part. Garrison Machine Works, Dayton, Ohio.

22. Glass-Bead Blasting. Bulletin PPD-109 describes a new machine for peening, cleaning and finishing by a patented process using specially-treated minute glass beads. Machine specifications are listed together with installation requirements and a cut-away view showing arrangement of components. Perfecto-Peen Division, Aero-Test Equipment Co. Dallas.

23. Barrel Finishing of Machine Parts, one of a Norton series of reports, tells how barrel-tumbling improves surface finish and fatigue strength, removes burrs, and forms uniform radii. It describes how many users have found Tumblex abrasives ideal for these applications. Norton Co., Worcester 6, Mass.

24. Pressure-Type Filter. Catalog offered presents the new Olson automatic pressure-type filter, available in eight standard models, from 10 gpm to 600 gpm capacities. Every cycle—precoat, run, backwash—is automatically controlled. Positive filtration (to ½ micron) for as little

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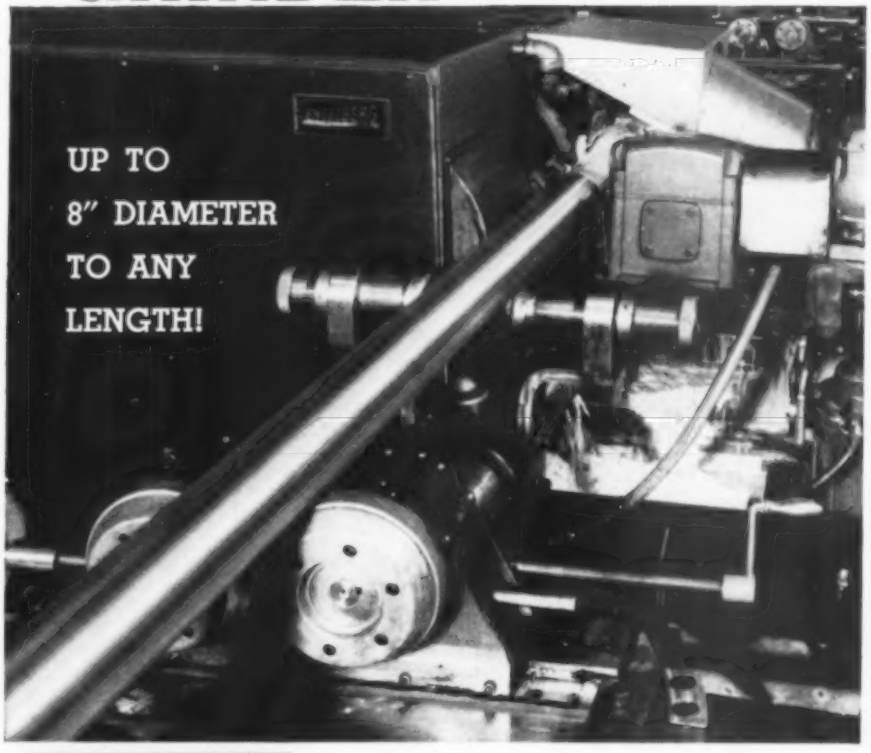

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as .00015c per gallon is reported. Olson Filtration Engineers, Div. of The American Laundry Machinery Co., Cincinnati 12, Ohio.

25. Tensile Testing Machines. A four-page illustrated booklet, Bulletin T-859, describes a line of tensile-testing machines with capacities up to 40,000 lb. Specifications, descriptions and methods of operation are listed for manual and motorized hydraulic models. Procedures for calibrating these units and using them for compression tests are fully covered. Steel City Testing Machines, Inc. Detroit, Michigan.

26. Abrasive Tech. The October issue of Abrasive Tech, a bi-monthly magazine stressing good coated-abrasive technology, features articles on abrasive belt machines, buffing of leather, and a new boating film. Behr-Manning Co., Troy, New York.

27. Precision Chucking Devices. A new four-page brochure describes Pratt & Whitney chucking devices, currently available in sizes ranging from 8" diameter to 50" diameter. These attachments are said to eliminate the fixturing previously required for accurate clamping of circular components, and substantially reducing the time required. Developed in conjunction with The Jacobs Manufacturing Company, the devices utilize the "Rubber-Flex" principle developed by that company. Torque control is available. Pratt & Whitney Company, Inc., West Hartford, Connecticut.

28. Diamond Dressing Tools. New literature is now available on Tru-Grit® diamond dressing tools. The brochure, a four-page two-color piece, describes the tools as concentrations of selected whole natural diamonds graded for size and shape. They are made to user specifications for better efficiency and economy in dressing formed, straight face and thread grinding wheels. Also available is a new job data form for supplying data about specific applications. Wheel Trueing Tool Company, Detroit, Mich.

29. Thread Measuring Instruments. Four-page, two-color brochure describes a new indicating thread plug gage for more rapid inspection of internal threads. The device is said to perform go and no-go inspection in one operation. Method is also claimed to eliminate wear on the measuring jaws. Also described in the brochure are an indicating roller thread comparator for inspection of external threads, an indicating screw thread snap gage and internal and external micrometers for thread measurements. Mahr Gage Company, Inc., New York, N.Y.

(See Number 27)

30. Lapping-Polishing Machines. Vibratory lapping-polishing machines are described in a new catalog section just issued. It contains complete descriptions, specifications and data for four Syntron machines. These machines provide easy mechanical polishing of metallurgical samples for microscopic examination. It eliminates hand work required to produce the necessary polish for electron microscope or brush analyzer testing of samples. Syntron Company, 1253 Lexington Ave., Homer City, Penn.

31. Pistol Grip Designed Portable Sand Blaster. New Model B "Sandy Jet" Sand Blaster featuring a newly designed pistol grip type blast gun is described in a bulletin from ALC Company. Using all types of abrasives with three sizes of job-suited nozzles, the blaster is one of the most versatile tools any type of shop can use. Needing no separate or special room, the abrasive can be easily contained in a small area with a simple cardboard box or cloth. ALC Company, Medina, Ohio.

32. Flexible Shaft Equipment. New eight page catalog of flexible shaft equipment and other labor saving Wyco Tools is now available. Several new Vari-Speed and Transformer Type Variable Speed Flexible Shaft Grinders are listed along

New COOLTEX keeps the work really cool

You can stop worrying about heat check when you switch to new Texaco Cooltex. This new chemical coolant is so efficient that wheels last up to four times longer—and you can use a finer grit, too! Your local Texaco Lubrication Engineer can fill in the details. Texaco Inc., 135 East 42nd Street, New York 17, N.Y.

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with wheel arbors and adapters, abrasive rolls, high speed sanding discs, mounted wheels, rotary files, buffing wheels and buffing compositions. Wyzenbeek & Staff, Inc., Chicago, Ill.

33. Automatic Drill Pointer. Described in literature from Winslow Product Engineering Corp. is their new Model 100 Winslo-Matic Drill Pointer. This machine automatically produces the Winslow Type 4 drill pointer other helical points, as well as conventional points. Four different power operated work heads are described. Winslow Product Engineering Corp., Arcadia, Calif.

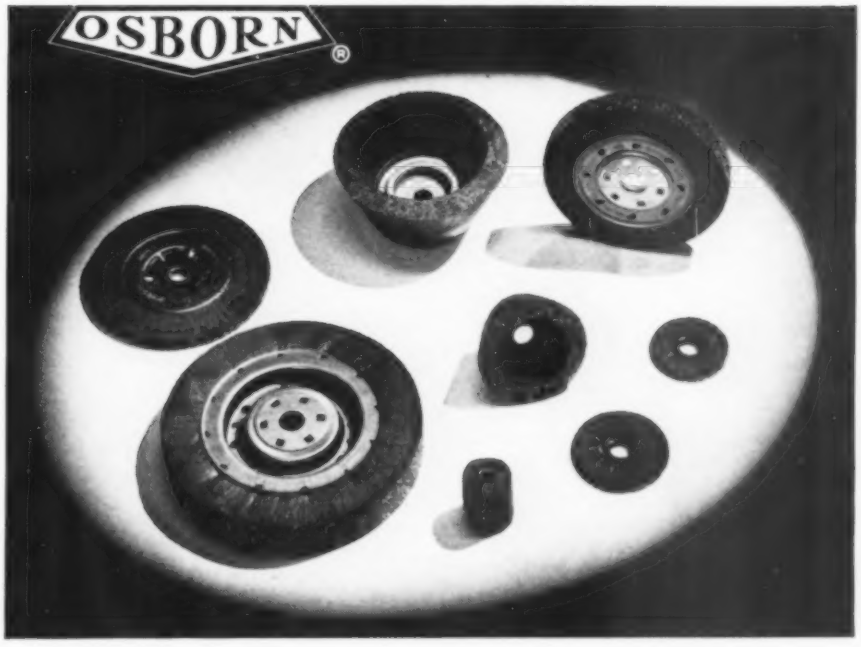
34. Internal Grinder. Detailed description and specifications are available on the new Bryant 1124-JY Internal Grinder. This versatile machine is designed for grinding roller bearing and ball bearing raceways in outer bearing races and straight bores in inner bearing races from 1" to 20" in diameter. Work parts are held in a shoe type centerless fixture which incorporates a rotary electro-magnetic chuck having a 21" magnetic driver with 18 adjustable pads. Bryant Chucking Grinder Co., Springfield, Vermont.

(See Number 36)

35. Grinding and Cutting. Technical journal published by Tyrolit features 12-page article on high-porosity abrasives and their applications. The currently available issue is for September-October, 1959, No. 2. Tyrolit, New York, N.Y.

36. Precision Measuring Instruments. The 1959-1960 catalog of Scherr-Tumico guide and catalog of precision measuring tools and instruments, 96 pages, is now available. The catalog contains detailed information on micrometers, vernier depth gages, snap gages, dial indicators, Ultra-Chex gage block sets, height gages, optical flats and other measuring tools and toolroom specialties. Scherr-Tumico, New York, New York.

37. Abrasive Segments. This eight-page brochure, "Abrasive Segments and Segmental Chucks for Better Surface Grinding" points out the advantages of the Cortland CD segment and of the Cortland chuck. Case studies of a variety of applications are included. The brochure also contains a list of grinding machines on which CD segments can be used, together with tabulations of data for both chucks and segments. Cortland Grinding Wheels Corporation, Chester, Massachusetts.



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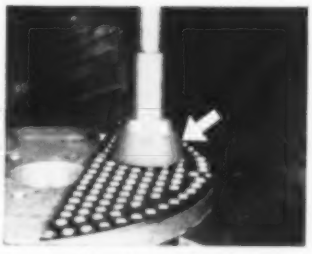
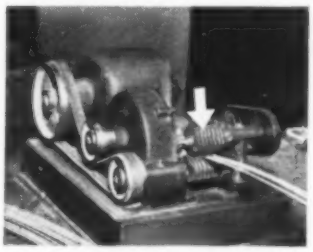


Application: deburring

Application: Surface finishing



Application: wire insulation stripping

In use today on a wide range of applications—Osborn TY® Tool Brushes are *engineered to cut finishing costs.* New TY Brushes are designed for jobs *beyond the reach* of standard wire power brushes.

Where rotary files, abrasive stones or belts, tumbling and shot blasting equipment have been used—TY Brushing Methods now do many of these jobs better and faster . . . at significantly less cost.

Do you know which operations in *your plant* can be done at high production rates . . . with better quality control . . . at less cost with new TY Brushes? An **O**sborn **B**rushing **A**nalysis—made in your plant now at no cost—is the first step. Write for full details.

Exclusive TY Brush advantages performance proved on-the-job:

- Maximum of work efficiency with minimum of pressure.
- Greatly increased brushing action strength.
- Positive control over area of brush contact.
- Complete uniformity of finish.
- Exceptionally long brushing tool life.

Write For Free TY® Brush Booklet... complete, illustrated application and specification data for production men. *The Osborn Manufacturing Company, Dept.* **G-1**, *Cleveland 14, Ohio.*

Osborn Brushes®

POWER, PAINT AND MAINTENANCE BRUSHES
METAL FINISHING MACHINES...AND FINISHING METHODS
FOUNDRY PRODUCTION MACHINERY

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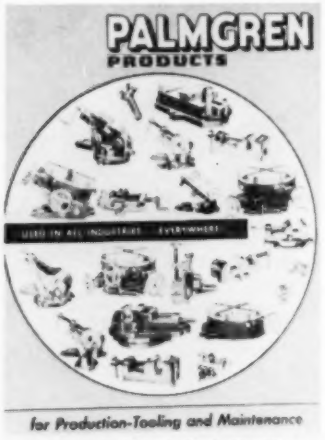
FREE LITERATURE *continued*

38. Work Holding Tools. A new catalog featuring a complete line of work-holding tools describes and illustrates more than 68 machine tool accessories, including angle vises, swivel machine vises, tilting tables, rotary tables and adjustable angle plates. Complete specifications and net prices are shown. Palmgren catalog No. 27. Chicago Tool and Engineering Company, Chicago, Illinois.

39. Blast Cleaning Barrels. A new 16-page bulletin on the Standard Duty line of Roto-blast cleaning barrels is directed to manufacturers of small- to medium-size castings, forgings or heat treated parts and molders of plastic forms. Bulletin No. 706 describes the features of barrels from 1½ to 18 cu. ft. capacity, gives complete dimensions and specifications, shows how each can be tailored to individual requirements. A section is devoted to case histories. The abrasive impeller is described. Pangborn Corporation, Hagerstown, Md.



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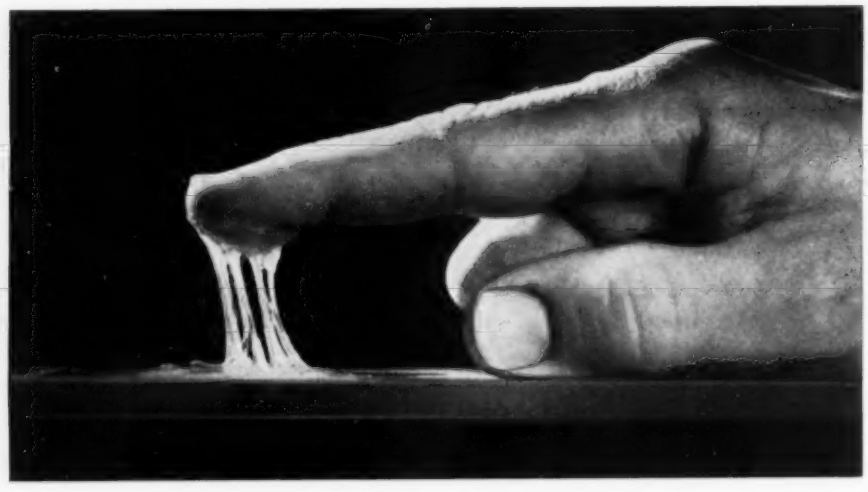

What's glue got to do with the price of finishing?

Stuck? Then you'll be interested to learn that glue is but one of several bonds used to hold the cutting grains to the backing in the manufacture of coated abrasives. Varnishes and resins are also common bonding materials. The problem is to select the proper bonding material to assure maximum belt life. Jewel Brand Abrasive Engineers know, for example, that glue is commonly recommended for dry, low heat applications while resins are usually required where toughness and resistance to water, heat and high working pressures are in demand. Their ability to recommend the proper bonding material often results in substantial savings in time, labor and materials. It will pay you to put their knowledge to work for you. Write for complete details. Abrasive Products, Inc., 517 Pearl Street, South Braintree, Mass.

belts
rolls
sheets
discs
specialties

JEWEL BRAND
COATED ABRASIVES

ABRASIVE PRODUCTS, INC., South Braintree 85, Massachusetts

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BOOK REVIEW

THE GRINDING WHEEL, A Text-Book of Modern Practice, By Kenneth B. Lewis, Revised Edition by W. F. Schleicher. 527 pages. Published under the auspices of The Grinding Wheel Institute, Cleveland, Ohio. Price: $4.95.

This revision of THE GRINDING WHEEL must be ranked as the outstanding general reference on abrasive wheels and other bonded abrasives today. Based on the 1951 publication by Lewis, which has been the last word in the industry for nearly a decade, it has included so much new material as to be almost an original work on its own.

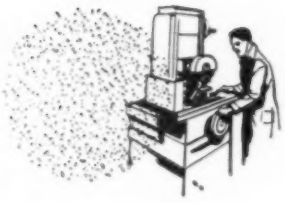
To note the three new chapters and more than 100 pages of new material is hardly adequate to indicate the scope of the revision. (For the reader who counts the 32 chapters of the revision as against the 28 of the first edition, Safety is now a chapter, was formerly in the appendix.)

Each chapter has been thoroughly rewritten to include advances in the art since 1951. The new chapters reflect changes in the importance of mounted and reinforced wheels, and the increasing emphasis on automation.

While the book has many purposes, it is primarily concerned with the use of grinding wheels.

With the continuing emphasis on precision in metalworking and related fields and steadily diminishing tolerances which can be achieved only with some form of abrasive, this book warrants a place in every tool room, grinding shop and plant library in the country.

"Hubert says it's a genuine industrial diamond."



Equipment and Materials

Improved Design of Polishing Machine for Reflector Shapes

An improved design of Acme automatic polishing machine for finishing a wide variety of reflectors and bowl-shaped parts is now available. The machine will finish reflectors, oval shapes, conical, cylindrical and bowl shapes in a fully automatic cycle. Parts made of aluminum-clad material, stainless steel, copper and brass can be effectively finished.

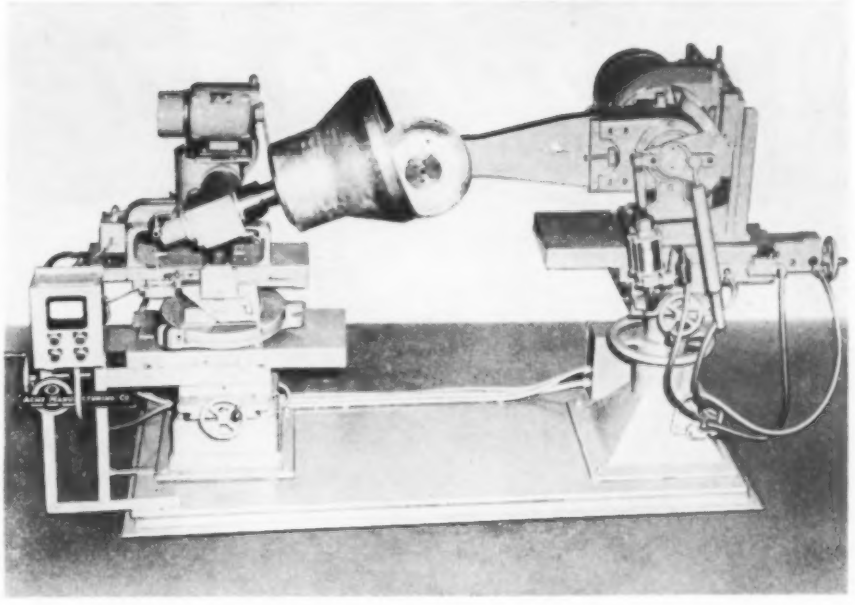
One unique feature of the machine is the automatic control of finishing wheel pressure when contact surfaces change from large to small radii. Air line pressure is automatically varied by a cam and switch arrangement.

Another feature is the automatic reversal of wheel rotation during the finishing cycle. This allows both cutting and coloring operations to be performed in one work cycle.

In the machine illustrated, the polishing wheel is powered by a 7½ hp motor, and the work spindle, by a ½ hp. motor. The machine occupies a floor space about 3'x9', with an overall height of about 52". Motor horsepower and other machine details can be varied to suit specific requirements.

Acme Manufacturing Co., Detroit, Michigan.

Use postpaid card. Circle No. 40

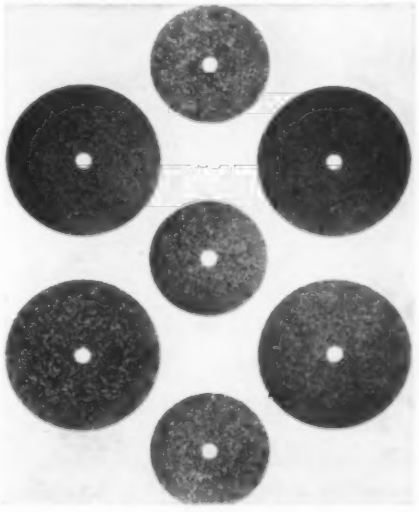


Process Change Lengthens Fibre-Back Disc Life

A unique blanking method is the basis for improved manufacturing processes that have resulted in substantially longer working cycles of the complete line of resin fibre abrasive discs manufactured by Michigan Abrasive.

Discs made by the new processes show greater ability to withstand greater working pressure on their periphery, reducing grain loss to a minimum.

"Improved process" discs are available in standard industry standards,



ranging from 5" to 9⅛" in diameter with ½" and ⅞" holes. Their chief use is in metalworking applications where heavy stock removal causes excessive heat generation. Manufactured with aluminum oxide abrasive, the discs come in a variety of grits ranging from 80 and finer down to 16. Full or spaced coating is optional, depending on the user's requirements.

Michigan Abrasive Company, Detroit, Michigan.

Use postpaid card. Circle No. 41

New Line of Tools

A new line of solid carbide fluted tools is now available from Kennametal Inc., Latrobe, Pa. It includes burs and internal grinding tools in addition to other types of similar tools.

These tools are in addition to the line of solid carbide end mills which

Kennametal announced several months ago. Catalogs for both lines are available. Many of the most popular sizes and styles of these tools are stocked at distribution points throughout the country.

Burs of 46 shapes and sizes up to ½" diameter may be had with six types of cutting surfaces.

Internal grinding tools include 17 sizes up to ⅜" diameter.

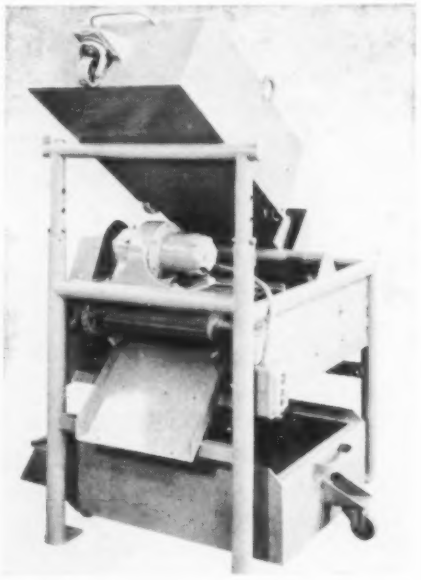
Kennametal Inc., Latrobe, Pa.

Use postpaid card. Circle No. 42

Compact, Low-Cost Magnetic Separator for Media, Parts

A new and compact magnetic separator provides a low-cost answer for those situations in which the size of the part, or holes or recessed area in the part, prohibit mechanical separation of media and parts.

Occupying minimum floor space, the new model No. 3550, separates ferrous parts from media. Both are carried on a conveyor belt which passes under a cleated parts-conveyor belt. A permanent magnetic plate located above the parts belt lifts the parts from the media. They are discharged into a tote box when they reach the end of the magnets.



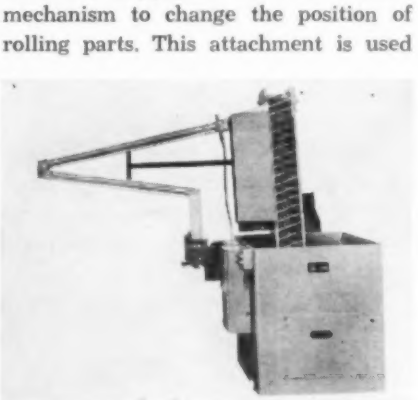
Both conveyor belts are neoprene vulcanized, and completely water-resistant. The parts belt has ⅜" x ⅜" cleats on 6" centers to insure movement. An optional demagnetizer is available.

Techline Division, Wheelabrator Corporation, Vickburg, Michigan.

Use postpaid card. Circle No. 43

New Transfer Equipment for Hopper Feed

Now added to the PFC Model 4000 elevating hopper feed is a transfer mechanism to change the position of rolling parts. This attachment is used



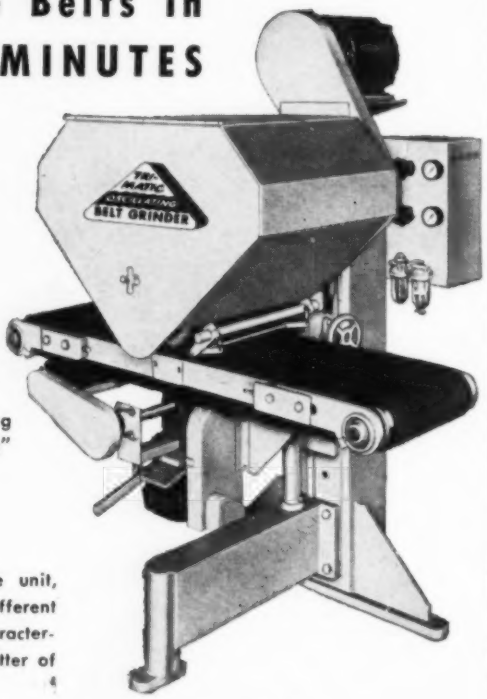
when parts must be changed from a rolling to an end-to-end position.

Rate of feed ranges up to 400 parts per minute. Thickness and diameter range gives adaptability to varying sizes of rolling parts. Cylindrical or headed pieces can be handled.

Model 4000 is a self-contained unit. Hopper capacities are 7½ or 12 cu. ft.

NEW TRI-MATIC Oscillating Belt Grinder

deburrs, descales, grinds, polishes, Change Abrasive Belts in LESS THAN 2 MINUTES



BELT TRACKING adjustments are completely eliminated by the Aer-Tronically Controlled belt oscillation. There are no projecting belt guides to interfere with changing or to fray belt edges. Just slide one belt off and another on. It takes less than 2 minutes from turning off the machine to re-starting.

4 MACHINE SIZES IN 1

A simple adjustment of the air jet sensing unit permits use of 6", 8", 10" or 12" wide belts.

EASY CHANGE CONTACT WHEEL

The contact wheel and mount are one unit, designed for easy changing. Where different jobs require different contact wheel characteristics, the change can be made in a matter of minutes.

Oscillating Belt Speeds Grinding, Prolongs Belt Life

By imparting a shearing action, instead of a straight line push, the abrasive belt cuts faster, cleans itself better, reduces grinding pattern to a minimum and makes belts last longer. Variable speed conveyor adds to versatility.

Write TODAY for illustrated, descriptive Bulletin TM-459.

Send your deburring, descaling, grinding, polishing problems to our abrasive engineers for their suggestions. No obligation.

TRI-MATIC DIVISION

Sales Service Mfg. Co.

2365 University Ave. St. Paul 14U, Minnesota

Use postpaid card. Circle No. 233

Elevating heights can be varied. The drive motor is ½ hp, 3-phase, 60 cycle, operating on 220/440 volts.

Production Feeder Corporation, Mentor, Ohio.

Use postpaid card. Circle No. 44

Portable Mist Collector

A new self-contained portable collector, Misty, Jr., is designed for clearing mist from various types of small machining operations.

The collector is compact—14" diameter x 26" high, including filter—and can be located close to the source of the mist to be collected. It may be suspended on chains supplied with the

unit, or stood on a nearby bench or shelf. Shipping weight is 18 pounds.

Its blower is adequate for small grinding operations where mist coolant is used. The fan is driven by a continuous duty motor operating from 115 volt single phase current.

Cost of the unit complete is $87.50 f.o.b. Ann Arbor, Michigan.

DustEnder Co., Ann Arbor, Mich.

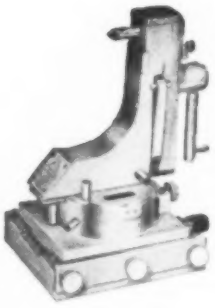
Use postpaid card. Circle No. 45

Heavy Duty Sander-Grinder Power Units

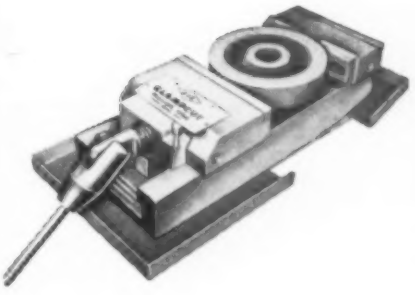
Two new Porter-Cable high speed industrial sander-grinder power units have recently been made available. They are the Model 539, for use with 9" discs and wheels, and the Model 540, recommended for use with 7" discs and wheels.

These tools are built with magnesium alloy housings to provide extra toughness without adding weight. Large ball bearings throughout and hardened spiral bevel gears give trouble-free operation under abusive conditions. A comfortable rear handle incorporates

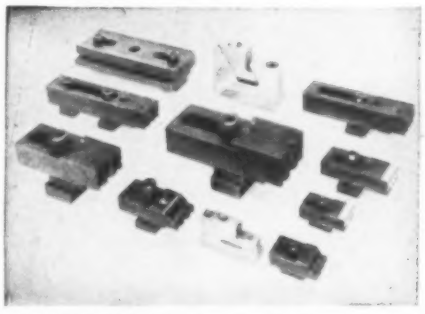
J&S DOWN-HOLDING DEVICES and WHEEL DRESSERS LEAD THE FIELD



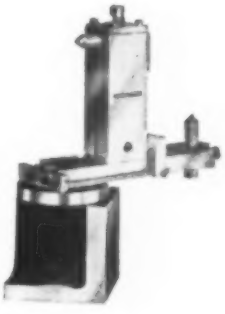
Fluidmotion Wheel Dressers—Dress two angles tangent to a radius, using ONE handle in one continuous motion. Operation is so fast and simple that beginners can use them. For all types cylindrical and surface grinders.



J & S Swivel Vise—The only hardened and ground swivel vise that mounts low, swivels, needs no pedestal. Patented down-holding clamping jaws give many times the holding power of an ordinary vise, yet only half the weight.



J & S All-Purpose Jaw Clamps — For any machine table or face plate. Five models—one adjusting screw has a holding force of 2½ tons on Small model, 12 tons on Jumbo model. Eliminate u-clamps, straps and fingers. No obstruction problems, no interference with measuring tool readings.



J & S Form-Master—Sturdy wheel dresser for shops with less frequent wheel dresser requirements. High quality, 100% dust-proof, it is capable of dressing any radii up to 12" convex, up to 15" concave.

Write for free literature and further information.

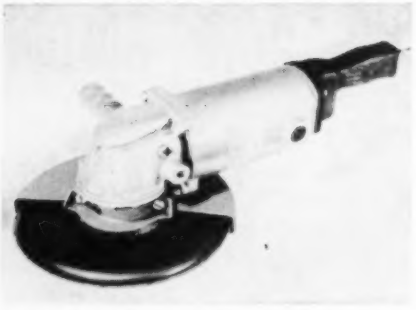
J&S TOOL CO. INC. — CLAMPCUT

J & S TOOL CO., INC.
880 DORSA STREET
LIVINGSTON, NEW JERSEY

Use postpaid card. Circle No. 234

a large trigger switch for extra safety. A push button lock on the spindle makes changing discs a fast, simple operation. Easy lubrication is provided by a removable side fitting.

Model 539 operates at 5300 rpm and 540, at 6000 rpm. Tools are powered by 2-hp motors operating on 110 volt or 220 volt AC 60 cycle current. Spindles are ⅝-11 R. H. Overall length of the tools is 19". Both models are equipped with 10' three-conductor cable with plug; removable vent for cleaning; reversible side handle; positive lock for



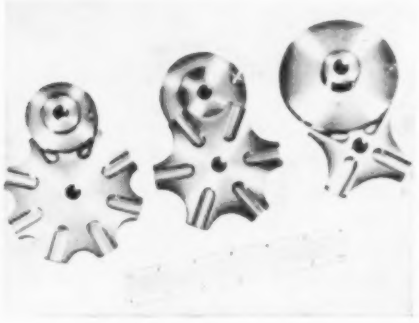
changing discs and disc clamp nut spacer. A variety of attachments are available.

Porter-Cable Machine Company, Syracuse, New York.

Use postpaid card. Circle No. 46

Miniature Drive Mechanism

A new standardized line of Miniature Geneva Drives now available. Called Micro-Geneva Drives, the new line, the first of its type in industry, is precision manufactured to assure accurate indexing, positive locking, high-speed performance and smooth trouble-free operation. An exclusive feature is the miniature cam follower bearing used



as the driving roller. Shaft sizes from .250" diameter to .500" diameter by 1/16" increments. Available from stock in 4, 6, and 8 point drives with driver to wheel center distances from .750" to 2.000" by 1/8" increments.

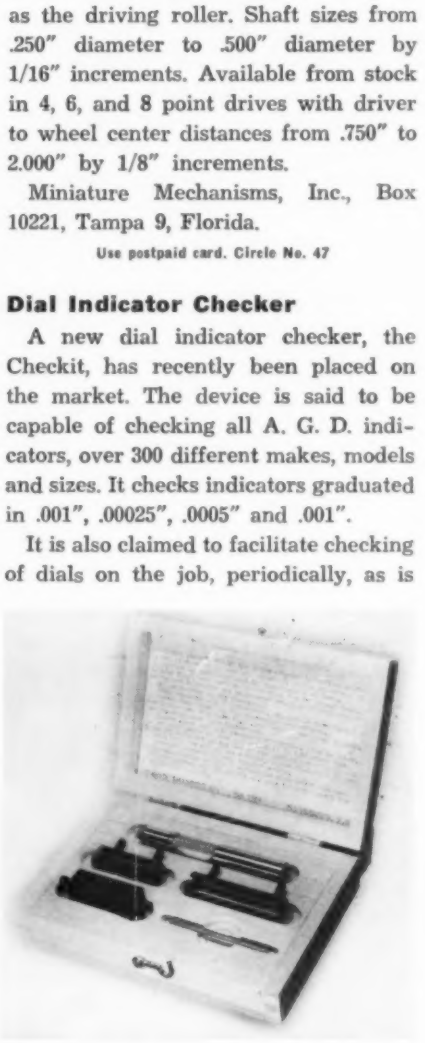
Miniature Mechanisms, Inc., Box 10221, Tampa 9, Florida.

Use postpaid card. Circle No. 47

Dial Indicator Checker

A new dial indicator checker, the Checkit, has recently been placed on the market. The device is said to be capable of checking all A. G. D. indicators, over 300 different makes, models and sizes. It checks indicators graduated in .001", .00025", .0005" and .001".

It is also claimed to facilitate checking of dials on the job, periodically, as is



done with plug and ring gages and gage blocks.

The unit is made up of a master micrometer and three adaptors for coupling it to regular, test-type or long range indicators for checking. It is priced at $38.00.

"Go-Devil" Instrument Co., Poughkeepsie, New York.

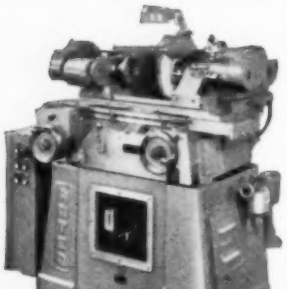
Use postpaid card. Circle No. 48

Best buy for tool room or small capacity production grinding

Here's a real dual-purpose machine that can be arranged for either internal or external grinding simply by changing wheelheads. Relatively low in price, it can handle toolroom as well as the production jobs requiring a small capacity machine.

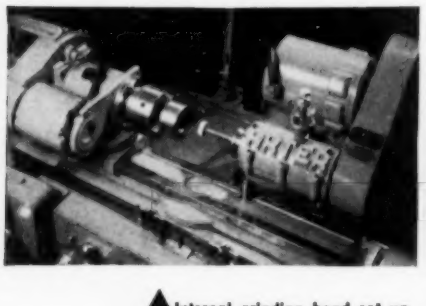
Separate wheelhead units are furnished for internal and external grinding. Thus, the basic machine can be purchased for either type of application and auxiliary equipment added at a later date. Internal wheelhead is bored 3" to take ball-bearing mounted spindle assemblies of 15000 or 32000 rpm. Work-head can be swiveled 90 degrees, has a graduated plate that provides accurate settings up to 30 degrees either side of center.

Standard features include complete hydraulic movement of table and wheel-



Internal or Plain Cylindrical Grinder.

head, centralized push-button controls, and diamond wheeldresser with graduated dial. Maximum feed is .0005", minimum is .0001" at each table reversal. Maximum capacities are: External, 3" O.D.; Internal, 3" I.D.



▲Internal grinding head set up to grind the bore of an arbor support bushing.

▲Workhead is swiveled 90 degrees in grinding face of a gear-shaper cutter.

Write today for details on the Sundstrand-Arter dual-purpose grinder. Bulletin 310.

SUNDSTRAND ARTER

SUNDSTRAND-ARTER Grinders

SUNDSTRAND MACHINE TOOL DIVISION OF SUNDSTRAND CORPORATION

Belvidere, Illinois, U. S. A.

Use postpaid card. Circle No. 235

New Fixtured Deburring and Finishing Machine

For fixtured deburring and finishing there is now available a new Mechamatic unit, the MM-2 HS-3000, which has been designed for low production of a multiplicity of parts or high production of a single component.

The parts are mounted on two air-operated spindle fixtures which are

submerged while rotating in a fluid abrasive mass which simulates a form-fitting grinding wheel regardless of the shape of the piecepart. The spindles rotate at approximately 2000 sfpm.

This model has two independently operated spindle heads which allow the operator to service one while the other is in process. Or the spindle stations may be interlocked.

At a 15-second time cycle the machine will produce 240 pieces per hour. It will process pieceparts up to 6" O.D. The Mechamatic process is completely automatic, except for loading and unloading.

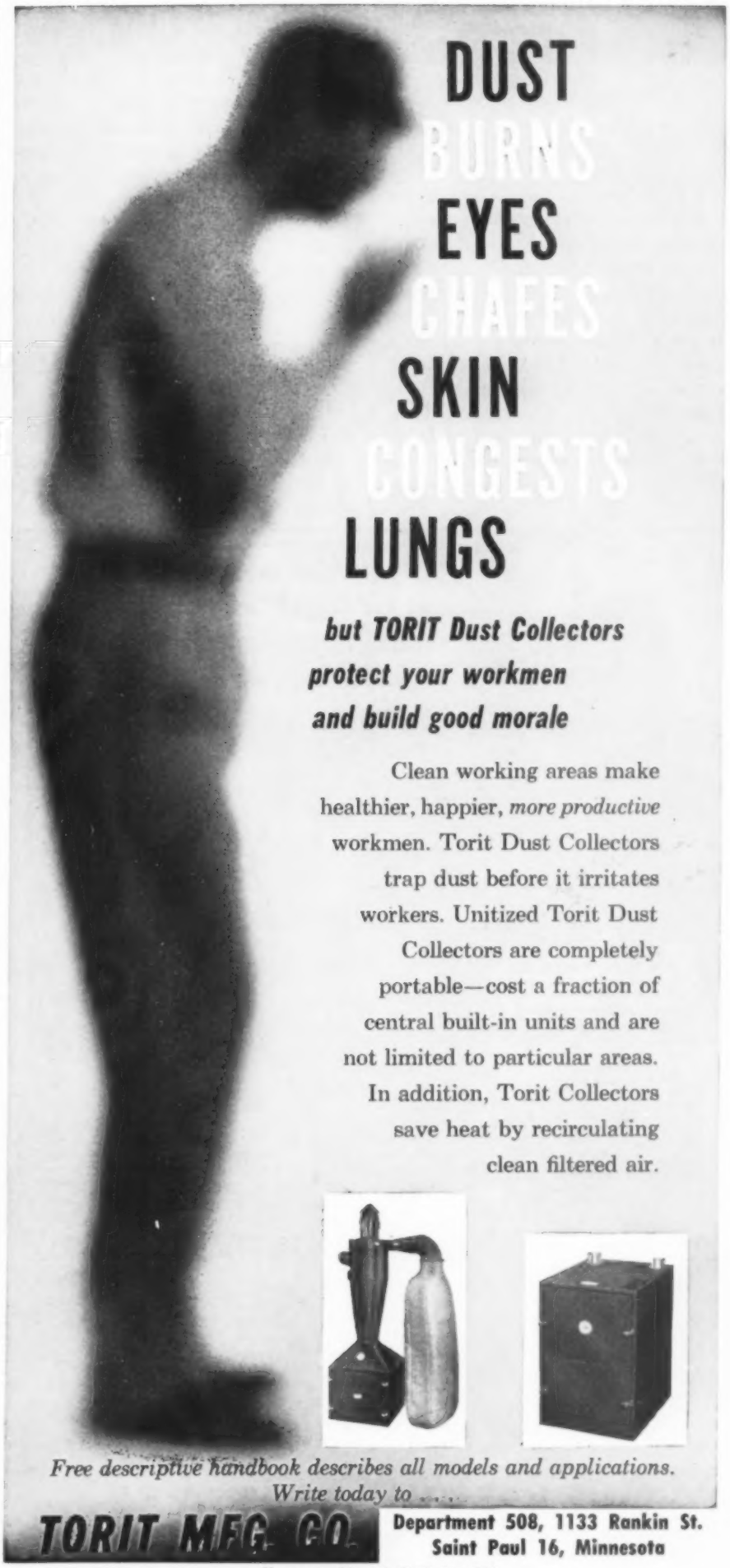
Mecha-Finish Corporation, Sturgis, Michigan.

Use postpaid card. Circle No. 49

New Sharpness Attained In Grinding Discs, Belts

A new line of resin-bonded aluminum oxide coated abrasives with a sharpness and cutting life never before attained has been developed in the laboratories of Behr-Manning Co. of Troy, N.Y., a division of Norton Company.

Marketed as Metalite Type 101, the new abrasive is available on fiber discs


DUST
BURNS
EYES
CHAFES
SKIN
CONGESTS
LUNGS
but TORIT Dust Collectors
protect your workmen
and build good morale
Clean working areas make healthier, happier, more productive workmen. Torit Dust Collectors trap dust before it irritates workers. Unitized Torit Dust Collectors are completely portable—cost a fraction of central built-in units and are not limited to particular areas. In addition, Torit Collectors save heat by recirculating clean filtered air.
Free descriptive handbook describes all models and applications.
Write today to .....
TORIT MFG. CO.
Department 508, 1133 Rankin St.
Saint Paul 16, Minnesota

Use postpaid card. Circle No. 236

and cloth belts, both characterized by a uniform and attractive brown color.

Tested in hundreds of applications, the new abrasive is said to out-perform existing materials almost without exception—a performance credited not only to an improved coating process but also to newly developed raw materials.

A modification of the Type 101 abrasive, labeled 101T and applied to fiber discs in the grit range from 24 to 60 inclusive, has proved particularly effective on stainless steel, brass, bronze and other alloys, where increased abrasive life is accompanied by a marked freedom from heating and resultant discoloration of the metal. Throughout, the Type 101 abrasive is said to exhibit extreme sharpness which is sustained even in rigorous service. This fast-cutting behavior, whenever present in a coated abrasive, is accompanied by cool cutting. The new material also gains in durability by keeping shedding to a minimum.

The Metallite Type 101 fiber discs are made in a grit range from 150 through 24; belts from 180 through 24.

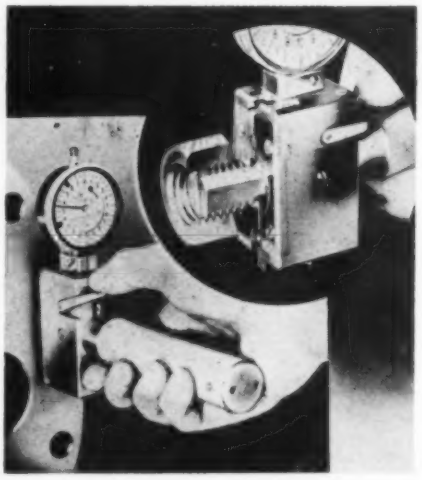
Behr-Manning Co., Troy, N.Y.

Use postpaid card. Circle No. 50

Dial Thread Plug Gage

A new dial thread plug gage is said to perform go and no-go inspection in one operation, speeding up the inspection of internal threads.

This measuring instrument employs three measuring jaws representing master thread gages, one of which is retractable between the other two. In this way the jaws can be inserted into the thread to be checked, without threading. They expand under spring action to engage the thread along its entire length.



Measuring segments are quickly interchangeable. One set of three segments is required for each type and thread size. Segments are said to have almost unlimited life as there is minimum wear during the measuring procedure.

Measuring blades with cylindrical faces convert the gage for measuring smooth bores or minor diameters of nuts. Four sizes cover a range from .080″ to 4.800″.

Mahr Gage Company, Inc., New York, New York.

Use postpaid card. Circle No. 51

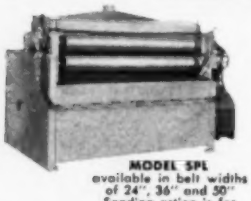
New Small Magnetic Chucks

The introduction of three small permanent magnetic chucks has rounded out the line offered by O. S. Walker Co., Inc. The new units are 4″ x 4″, 4″ x 8″ and 6″ x 6″. All three offer the principal features of larger chucks, including ceramic magnets, all

"Only machine capable of handling our rugged and precision sanding requirements on large aluminum panels"*

*Reported by
N. B. Barsha, Plant Engineer
Cupples Products Corp.
St. Louis, Mo.

TIMESAVER SPEEDBELT SANDERS



MODEL SPL
available in belt widths of 24", 36" and 50"
Sanding action is for underside of work.

MODEL TOP
available in belt widths of 24", 36", 50" and 54"
Sanding action is overhead.

"We were faced with the problem of sanding 1000 vertical aluminum panels, 28'x24"x3/16" for the exterior of the new U.S. Air Force Academy buildings. These panels required finishing to a uniform and precision surface specification. Before we purchased the Timesaver Model TOP-50, we thoroughly investigated the market for sanding machines of this type. The Timesaver "Speedbelt" was the only unit which possessed the durability, accuracy and rugged construction necessary for our requirements."

The Cupples Products Corporation's experience is typical of Timesaver "Speedbelt" Installations throughout the country . . . where performance and need to achieve production and cut costs is important. They can do all flat metal surface finishing, polishing and sanding formerly assigned to other methods . . . and do them better. What's more, savings made in labor, materials and maintenance soon pay for their low initial cost.

Investigate the advantages of Timesaver Sanders for your plant, write for literature and information today.

TIMESAVER SANDERS
P.O. Box 7446, Robbinsdale Station • Minneapolis 22, Minn.
Pioneers in Wide Belt Sanding for the Woodworking Industry
Use postpaid card. Circle No. 237

steel face, light weight, low height and fine pole divisions. Their small size makes them particularly useful for toolroom use.

O. S. Walker Co., Inc., Worcester, Massachusetts.

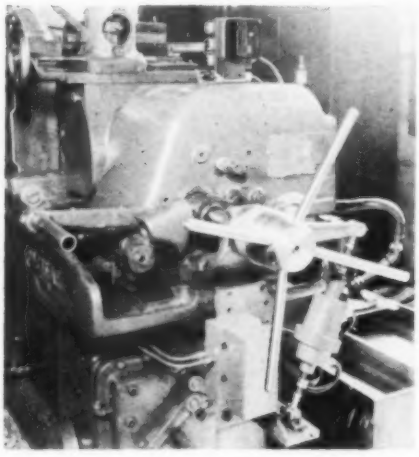
Use postpaid card. Circle No. 52

Centerless Automation Controls

Two Citco units provide controls for automating centerless grinders.

The compensating unit shown at the right end of the centerless grinder illustrated below operates from either push-button or automatic gage instructions. If the first is sufficient, the operator pushes the automatic sizing button when the size of the piece-parts approaches the high limit. On automatic gaging, the unit controls sizing and dressing as long as work-pieces are being fed through the machine.

The unit adjusts for wheel wear as well as for abrasive dressed off the wheel. A counter is set so that a dressing cycle is started after a predetermined number of compensating adjustments.



The automatic dresser at the left end of the machine takes care of such things as keeping the diamond sharp by hydraulic turning, turning the coolant on and off, and feeding the dresser barrel into the wheel for rough and finish dressing. The amount of dress and the rate for both rough and finish dressing are adjustable. Once set, they are locked and require no further attention from the operator.

The automatic dresser may be used independently, controlled by a timer or the operator.

Cleveland Industrial Tool Company, Inc., Chardon, Ohio.

Use postpaid card. Circle No. 53

Planning To Reduce Costs?

. . . on high speed grinding and finishing jobs

Then Check On!

HOFFMAN

"Narrow-Kerf"

DIAMOND BITS

Hoffman "Narrow Kerf"* Bits are currently in use for countless high speed operations on such materials as glass, marble, granite, ceramic, zac, monofrax pyroceram, etc.

If low production costs and outstanding performance are important . . . then it will pay you to investigate the savings possible with Hoffman "Narrow Kerf"* Bits, available with Diamond Impregnated or Diamond Surface Set cutting faces, these bits will help you establish new standards of production and quality on items of the hardest materials known.

Actual performance records show one instance where Hoffman Bits are drilling 16,000 holes per bit on a glass job. On Ceramic Lamp Base drilling operation, Hoffman Bits last 5 times longer with less than .005" OD variance.

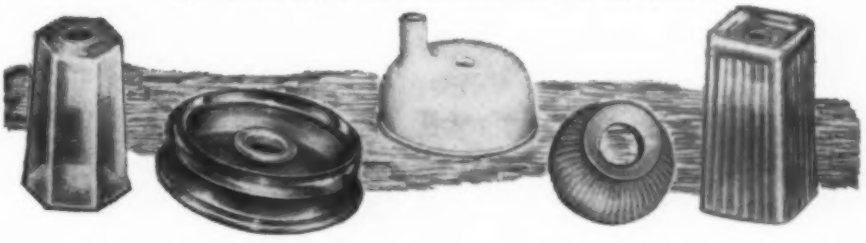
Because Hoffman designs every "Narrow Kerf"* Bit for the specific job . . . users are assured of the best possible performance. Tests are made from customer's material samples in Hoffman's Laboratories with full reports supplied to the customer.

Let Hoffman design a better bit for your coring work. Simply send a material sample for testing at NO OBLIGATION TO YOU.

Watch for new data soon to be released covering the success of Hoffman Bits in coring tungsten carbide, titanium, ferrous magnetite, etc.

*Represents Wall Thickness of Diamond Crown from .015" to .093".

Hoffman Bits Produce These and Similar Items At High Speed.



Send for Literature and Prices . . . Ask about Sample Testing

HOFFMAN BROS. DRILLING COMPANY

102 CEDAR STREET **PUNXSUTAWNEY, PENNA.**

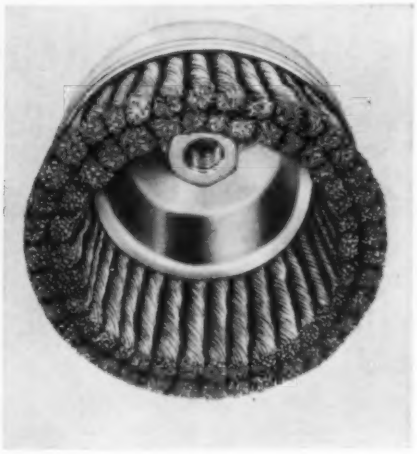
Use postpaid card. Circle No. 238

New Design in Wire Cup Brushes

A newly-designed cup brush, known as the UDX-6 model is said to combine four major performance and safety features not found in any other cup brush on the market.

The main improvement is in the turret back of the cup, which absorbs operational stresses at high speeds, making it possible to run the brushes at up to twice former maximum speeds—as high as 7,000 rpm.

A second new feature is the rolled



bead design, replacing former sharp edges and eliminating breakage of outside wires even under severe usage.

An internally mounted nut which tightens in operation and allows the brush to be mounted closer to the tool, reducing bearing wear and operator fatigue.

Construction permits two full rows of tufts and more wires per tuft, for faster cutting and longer life.

Anderson Corporation, Worcester, Massachusetts.

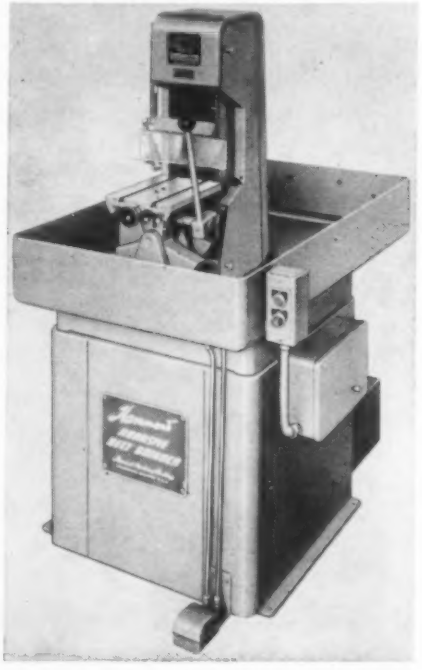
Use postpaid card. Circle No. 54

Abrasive Belt Grinder

A new 6" platen abrasive belt grinder, Hammond Model VHP-6, is said to offer the most advanced features of any grinder of its type.

Belt tracking is on the outside away from coolant and grit. Air tensioning on the belt assures uniform tension and sufficient belt stretch for maximum belt life.

The hood door is recessed for right-angle work. The machine is easily



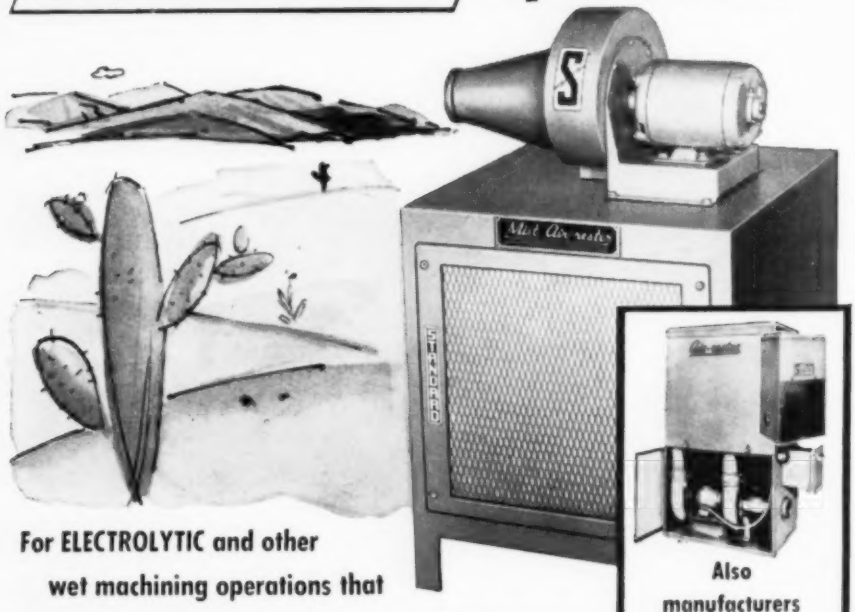
changed from vertical to horizontal. Pulleys, running on sealed ball bearings, are dynamically balanced. Drive is multi-V-belt.

Coolant splash is controlled with a modern hood, pan and sprayer. The sprayer applies a heavy lay of coolant on the belt and the work. A curtain, adjustable vertically, traps splash at the work level.

Several styles of platen faces are available as extras. These include a chrome-faced platen for manual grinding and a carbide-faced platen for semi-automatic grinding. Platens are reversible for maximum life.

Takes machining moisture out of shop air

Mist Air-rester by STANDARD



Also manufacturers of the famous AIR-RESTER Dust Collector

For ELECTROLYTIC and other wet machining operations that create objectionable fog or mist, here is the answer in one EFFICIENT, LOW COST unit.

Requires no expensive ductwork.

Provides clean, dry air for workers, eliminates clouded lights and reduces your maintenance cost. FOR FULL DETAILS, write today for bulletin.

the STANDARD electrical tool co.

2478 RIVER ROAD • CINCINNATI 4, • OHIO

Use postpaid card. Circle No. 239

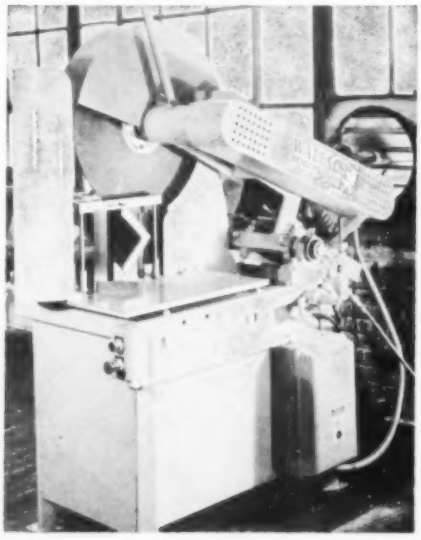
Platen surface is 6" x 12½", with an abrasive belt working surface 6" x 9½". Belt speed is 3400 sfpm; and belt size (belts not furnished) is 6" x 60".

Hammond Machinery Builders, Inc., 1651 Douglas Avenue, Kalamazoo, Mich.

Use postpaid card. Circle No. 55

Abrasive Cut-Off Machines for 26" Wheels

A Wallace Modular "Cut-Machining" unit for 26" diameter cut-off wheels is now available. It adds to the line which previously included units for 16", 18" and 20" wheels.



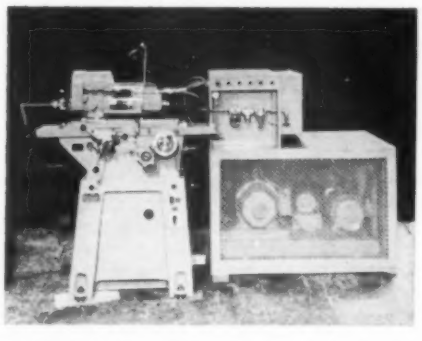
The new unit cuts wide flange beams up to 8" x 8" x 69 lb., 8" extra heavy pipe and 5" round or 4" square solid bars.

Wallace Supplies Mfg. Co., Chicago, 14, Illinois.

Use postpaid card. Circle No. 56

High-Frequency Spindle

A high-frequency spindle providing speeds up to 100,000 rpm is now offered on Rivett's Model 84 internal grinder. The unit was developed in cooperation



with the Allentown Works of Western Electric for grinding small holes with tolerances of ± .0004". Speeds in this range are ideal for improving the per-

POSITIVE FILTRATION

(TO 1/2 MICRON) FOR AS LITTLE AS

.00015¢ PER GALLON!

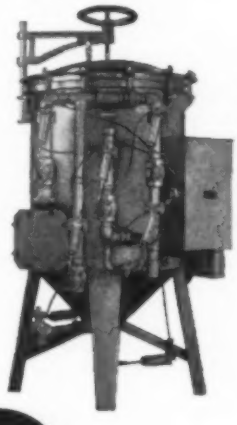
AND IT'S COMPLETELY AUTOMATIC!

Now, from Olson, a new dimension in industrial filtration — the first completely automatic, pressure-type filter! Every cycle — precoat, run, backwash—is automatically controlled. Injection of filter-aid (when used) and sludge carry-out are also automatic.

Maintenance is virtually eliminated in this trouble-free system. No parts to change, no elements to replace, and most important, *no costly downtime for cleaning!*

In large central systems, or with individual machines, Olson Filters guarantee over 96% purification of all types of coolants, cutting oils, quenching oils, cleaning and washing solutions and other industrial solvents at the lowest cost per gallon.

By the way, what are *your* costs per gallon? Why not check and see? Then call Olson.



The new Olson Industrial Filter is available in 8 standard models, from 10 gpm to 600 gpm capacities.

Write for free catalog on the new Olson automatic pressure-type filter.

OLSON FILTRATION ENGINEERS

Division of The American Laundry Machinery Company

DEPT. G., CINCINNATI 12, OHIO

Use postpaid card. Circle No. 240

WALLS TU-WAY BELT SANDER

USE IT EITHER WAY

Full 1/3 h.p. G. E. Motor

At last, a top quality industrial sander that provides all the most wanted features — yet sells for so little..

complete with cord, plug, switch ready to use **$89.95**

Illustrated Literature on Request

A few desirable distributor territories still available.

WALLS SALES CORPORATION

333 Nassau Avenue Brooklyn 22, N. Y.

Use postpaid card. Circle No. 241

formance of small mounted wheels—something on the order of a Shape W 167, 5/16" x 1/4" on a 3/16" mandrel with 1/2" overhang or smaller.

The spindles are powered by a high-frequency electrical wheelhead and are securely mounted on the bed with an extra-heavy bracket. Hole sizes from less than 1/8" diameter up to 3" may be ground to a microinch finish. The spindle has oil mist lubrication and is water cooled. Automatic in-feed from .0006" to .00001" is provided.

The complete high-frequency spindle and driving unit is furnished as a package, and can be applied to any standard Rivett Model 84 internal grinder.

Rivett Lathe & Grinder, Inc., Boston, Massachusetts.

Use postpaid card. Circle No. 57

New Illuminated Magnifier

A new illuminated fixture, the Clear-Lite Magnifier, has been added to the Stocker & Yale line of fluorescent work lights. The fixture features a 6" optically ground and polished scratch-resistant bi-convex lens of 11" focal length. Balanced illumination and 2X magnification assure maximum visual acuity for day-long inspection testing

and production operations where magnification is required.

Full field illumination is supplied by fluorescent lamps in 4- or 8-watt sizes, producing 100-500 foot-candles in the working area.

Stocker & Yale, Inc., Marblehead, Massachusetts.

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TURNABLE

the diamond tools with a NEW TWIST!

Cost No More—Last Longer!

A flick of the wrist and your diamond is **turned!**

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The Only Diamond Tool with **BUILT-IN TURNER!**

ORDER ONE TODAY!

Shank and diamond sizes for all grinders. Send for FREE detailed literature. Distributor inquiries invited.

CITCO *solid copper diamond tools*

BOX 84, CHARDON, OHIO • AV-6-4124

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Air Die Grinder Delivers up to 25,000 Controllable RPM's

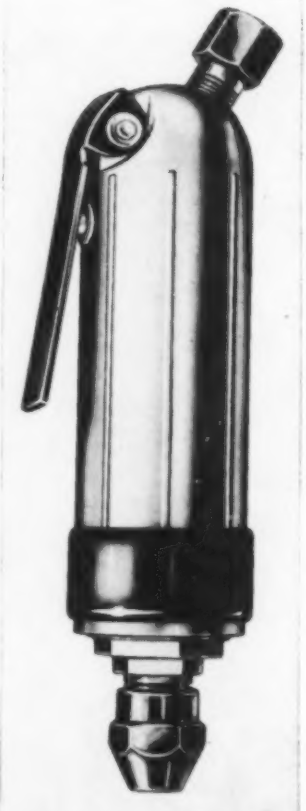
A new Model 1600 air die grinder has a metering trigger that delivers up to 25,000 rpm which lets the operator "throttle down" for feather edging.

The grinder is recommended for polishing, wire brushing and metal removal on dies, stampings, gear teeth, tubes, plastics, castings and weldments.

Wheel capacity is 1¼" vitrified and 1½" organic. The grinder takes standard rotary files, standard or carbide wheels, wire brushes, mounted wheels and sanding drums.

Air consumption of 6 cfm @ 90 psi is said to be half that of a conventional unit. Weight is 15 oz., length, 6". Two collets are furnished: a ¼" machined on the shaft for minimum "run-out" and a ⅛" that slips into the ¼" collet body. Price complete, $89.50.

Superior Pneumatic and Mfg., Inc., Cleveland, Ohio.



Use postpaid card. Circle No. 59

Abrasive Belt Head for Convex, Concave Surfaces

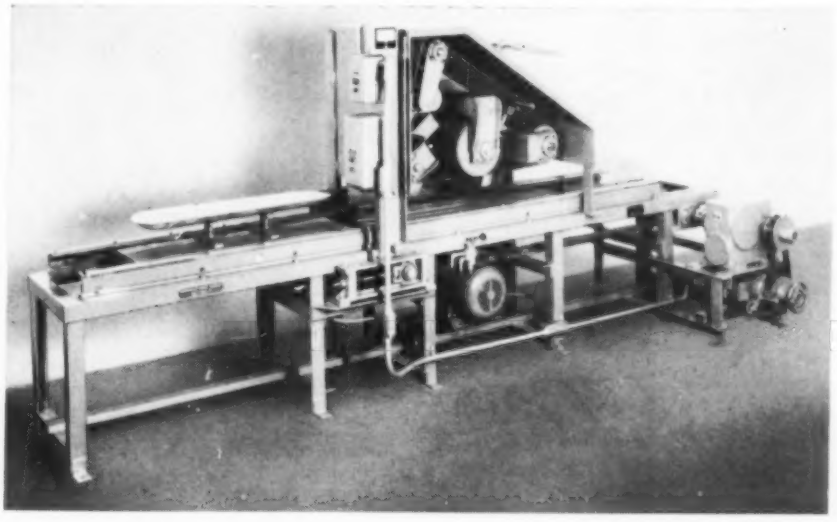
A new abrasive belt head for grinding and polishing convex or concave surfaces of aluminum, brass and steel castings is now being produced by Murray-Way Corporation.

Positive belt control at heavy work pressure is provided by a special M-W designed, air-operated scanning eye which prevents belt run-off. With this positive belt control, a heavier cut may be taken and fewer passes are necessary.

The new head considerably shortens the time required to buff convex and and concave surfaces. As the abrasive belt oscillates, tension take-up is air-controlled. The contact roll is supported by a sturdy outboard bearing arm, and an ammeter is provided to show work effort. A continuous chain reciprocates the platen-mounted fixture.

Murray-Way Corp., Box 180, Birmingham, Michigan.

Use postpaid card. Circle No. 60



Caveat Emptor!
...fact and fiction

Vapor Blast Used Glass Beads in '51!

VAPOR BLAST pioneered and originated the "wet blast" process of metal surface treatment, perfecting it to precision Liquid Honing in 1940. They successfully used glass beads for surface peening as early as 1951.

(Newcomers claim: "glass beads . . . a unique new method for surface or impact treatment".)

An 8-year process is hardly "new"!

VAPOR BLAST Liquid Honing Exposes Invisible Cracks!

One of many benefits of Vapor Blast Liquid Honing is precision surface cleaning to expose "invisible" cracks for inspection, and preparing or opening metal pores for better oil retention. Now check this contradiction:

(Newcomers say: "Surface pores are closed and fine cracks exposed".)

An impossibility!

HEAVY DUTY CONSTRUCTION!

A Vapor Blast 6'-6" 4836 Liquid Honing Unit of S.A.E. 1020 steel weighs 1200 lbs., net. It's truly heavy duty, yet with no wasted weight.

(Newcomers call a similar size unit, made of Stainless Steel "heavy duty construction". Yet, is weighs only 630 lbs.)

Experience Has No Substitute:

VAPOR BLAST LIQUID HONING* is the *original* liquid abrasive surface conditioning process — proved in peening, finishing, cleaning, descaling and deburring in hundreds of plants in every industry. That's fact! Insist on the original — get the complete story of Vapor Blast Liquid Honing — or send us samples for laboratory processing without obligation.

*Liquid Honing and Vapor Blast are trademarks.

VAPOR V·B BLAST MILWAUKEE WISCONSIN

VAPOR BLAST MFG. CO.
3063 West Atkinson Ave
Milwaukee 16, Wisconsin

Use postpaid card. Circle No. 243

New Centerless Grinder

With the introduction of the Model No. SR-3, Eric R. Bachmann Company now has available four sizes of Herminghausen centerless grinders. The

new grinder was first exhibited at the 6th European Machine Tool Show in Paris.

All four of the grinders have identical leading design features:

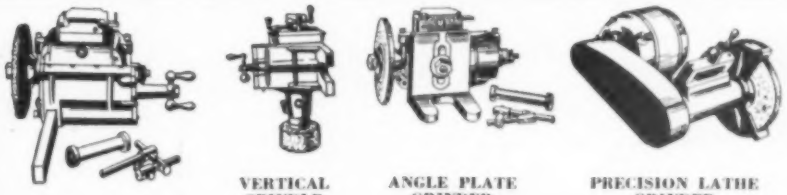
Plain bearings for the spindles are fitted with universally self-adjusting segmental bearing shoes.

Variation of regulating wheel speed by the use of a d-c motor permits ad-

GRINDING ATTACHMENTS
• for lathes, planers, boring mills, milling machines, shapers, etc.

For tool rooms and shops handling a wide variety and range of work from the simplest to the most complicated. For internal and external grinding, grinding centers, reamers, taps, dies, rolls, journals, crankshafts, cylindrical, surface or special purpose grinding. With or without horizontal or vertical feeds.

• for FASTER . . . EASIER . . . MORE ECONOMICAL GRINDING EASILY MOUNTED FOR ALL SUPPLEMENTARY GRINDING



TOOL POST GRINDER | VERTICAL SPINDLE GRINDER | ANGLE PLATE GRINDER | PRECISION LATHE GRINDER

also special Motorized Spindles

"OVER 60 YEARS SERVICE TO INDUSTRY" WRITE FOR CATALOGS

The United States Electrical Tool Co.
3640 LLEWELLYN ST., CINCINNATI 23, OHIO

Use postpaid card. Circle No. 244

justment without steps over the range of speed required.

Roller guidance for regulating wheel slide allows adjustments in increments of .00004".

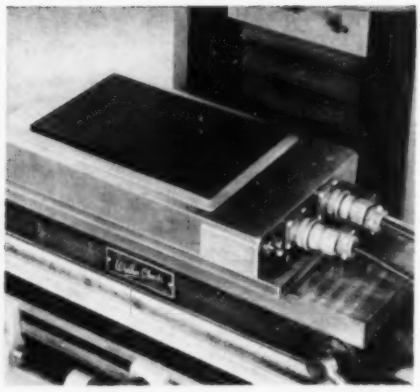
Eric R. Bachmann Company, Inc., Long Island City 1, New York.

Use postpaid card. Circle No. 61

Small Size Chuck Holds All Metals, Non-Metallics

A small production model of the new Electroforce electrostatic chucking system which for the first time has allowed precision surface chucking of non-magnetic metals and non-conductors is now available.

The new small unit, with 5" x 8" work-holding surface, has been developed primarily for experimental shops, tool rooms and short-run production. The small unit is supplied as a complete system, with compact power supply, mist dielectric coolant unit, stops,



dresser holder, fluids and recoating kit.

Electrostatic chucking permits precision chucking of such non-magnetic metals as brass, aluminum, titanium, etc., as well as non-conductors such as ceramics and plastics, if these are first "flashed" with even a few millionths of an inch coating of conductive metal.

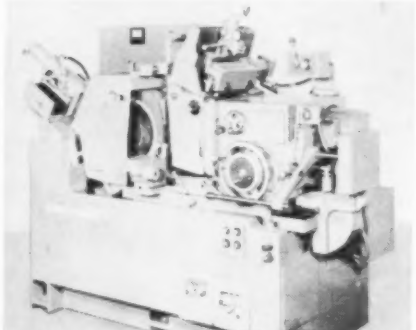
Electroforce, Inc., Fairfield, Conn.

Use postpaid card. Circle No. 62

Job Shop Centerless Grinder

Designed specifically for the job shop, the new 210-6 centerless grinder is part of the completely new Centuramic line of Cincinnati Milling Machine Co. The 210-6, a 10 hp machine, handles up to 3" OD work with a standard wheel width of 6" and provisions for counterbored wheels up to 8" wide.

Also in the new Centuramic line are the 220-8, a 20 hp grinder with standard wheel width of 8"; the 325-12—25 hp, 12" wheel width; the 330-15—30 hp, 15" wheel width, and the 340-20—40 hp, 20" wheel width. The 300 series machines offer the added economy of wide wheel grinding which permits higher feed rates and fewer passes to obtain a specified size and finish.



Cincinnati Milling Machine Company, Cincinnati, Ohio.

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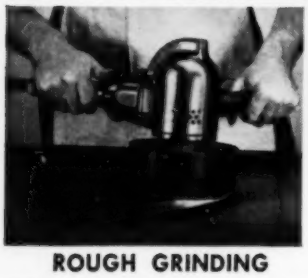
Airetool Grinders Speed Production



ROUGH GRINDING

FINE FINISHING

When you want to take down rough spots, or speed up a tough grinding job on flat or curved surfaces, use Airetool Model 700-V pneumatic grinder, left above. It's easy to handle with 6" cup wheel or brush, available in 4500 or 6000 rpm models.

Model 500-V pneumatic sander (above, at right) is perfectly balanced for feather-edge accuracy in fine metal finishing. Takes 7" sanding disc. 3 models with 2300, 3000 and 4000 rpm speeds.

For full information about Airetool pneumatic production tools, write for Bulletin 67. Airetool Manufacturing Company, Springfield, Ohio.

BRANCH OFFICES: New York, Chicago, Tulsa, Philadelphia, Houston, Baton Rouge
REPRESENTATIVES in principal cities of U.S.A., Canada, Mexico, South America, England, Europe, Puerto Rico, Italy, Japan, Hawaii.
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AIRETOOL
MANUFACTURING COMPANY
SPRINGFIELD, OHIO

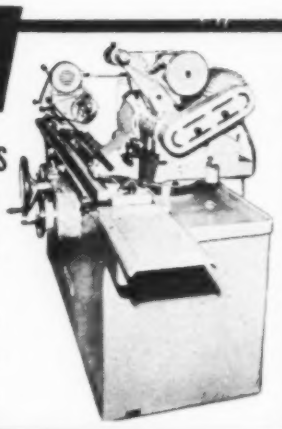
Use postpaid card. Circle No. 245

LOW COST GRINDERS

RIBON UNIVERSAL OD-ID GRINDERS

Electro mechanical models produced by one of Europe's largest grinding manufacturers—completely universal with swinging internal grinding heads. 14" x 1" O.D. Wheels.

11" x 20" $3750.00
11" x 32" $3950.00
11" x 42" $4200.00



CENTRI CENTERLESS GRINDERS

Close tolerance production units capable of .0001" tolerances in production. Equipped for bar feed, thru feed, and infeed work with automatic ejectors and automatic cycling on infeed where desired.

MODEL 0 Work diameters .012"-⅝" $2450.00

MODEL 1 Work diameters .016"-2" ($3650.00)

MODEL 3 Work diameter .030"-3" ($6750.00)

THE AMERICAN HERFORDER CORP.
1801 W. COLUMBIA AVE. CHICAGO, ILLINOIS

Use postpaid card. Circle No. 246

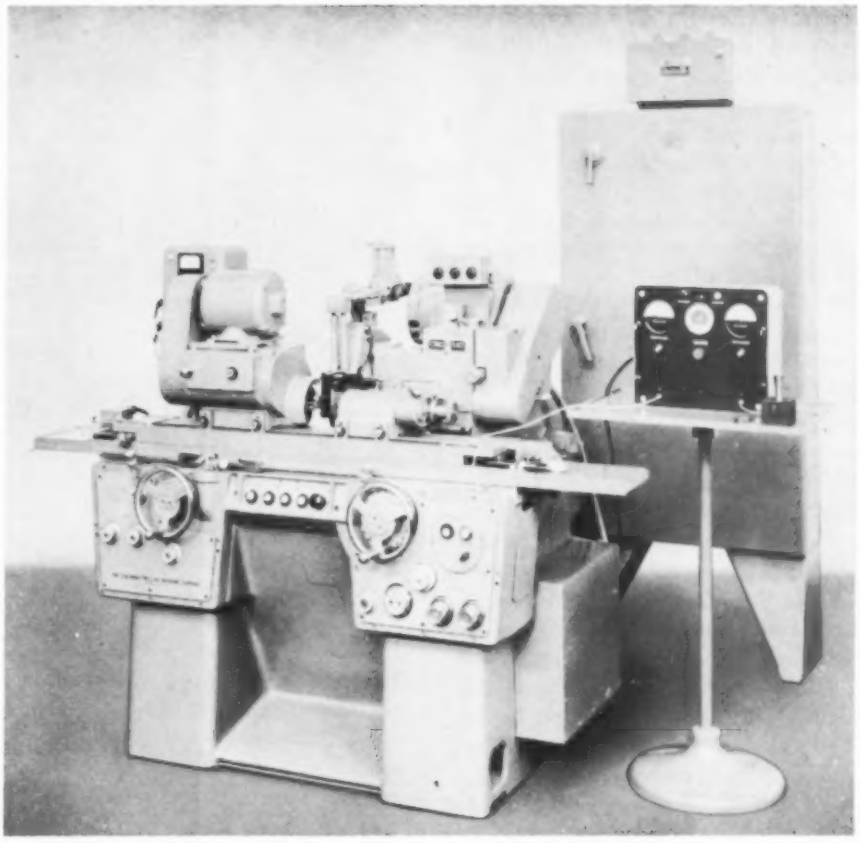
Grinder and Gaging System for Matched Hole Grinding

A grinder with an integral gaging system that will grind mating parts to fit within a few millionths of an inch has just been announced. The machine is a Cincinnati 4" Super Precision Grinder with built-in Grind-A-Mate gaging system.

It is expected to be used for grinding such critical mating parts as missile control valves, fuel injector plungers and ultra-precision shaft-like parts. It can also be used to grind one-of-a-kind parts such as master gages and other high-production parts under gage control.

All machine elements are under complete control in the automatic cycle so that any good grinder operator can produce consistently accurate work.

It is said to achieve tolerances within .000010" for roundness, .000020" for straightness, .000025" for size and four microinches for surface finish. The Cincinnati Air Jet Caliper built into the grinder does not touch the work.



Weight of the grinder has been increased substantially; for example, minimum wall thickness in the base casting is ¾". All motors are super-dynamically balanced. Special attention is given to transmission of power to

HERE IT IS...

The BRAND NEW MAUSER INDICATOR

- DIRECT READING TO .00005"
- FULL RANGE OF DIAL .004"
- DIAL GRADUATIONS 20-0-20

FULLY JEWELED & SHOCKPROOF MOVEMENT

LARGE VARIETY OF CONTACT TIPS AVAILABLE FROM STOCK

CAT. #658

ONLY $32.50

IN PLASTIC CASE WITH CABLE RELEASE

MAUSER INDICATOR STAND

- 2-½" DIA. HARDENED GROUND & LAPPED TABLE
- 6" VERTICAL CAPACITY
- FINE ADJUSTMENT OF VERTICAL CAPACITY BY MEANS OF KNURLED RING WITH INSTANT LOCKING
- WILL ACCOMMODATE ALL INDICATORS WITH 8mm. SHANK

Cat. #6131F — ONLY $29.75

THE MAUSER INDICATOR IS ALSO AVAILABLE GRADUATED FOR DIRECT READING .0005" WITH .016" FULL RANGE OF DIAL.

Cat. #657 — ONLY $16.00

For Complete Information request our 96 Page Catalog — Contact any of our 4 "Coast to Coast" Locations or your nearest Local Distributor.

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When writing to any of the above locations, refer to DEPT M

Use postpaid card. Circle No. 247

Smoothest finisher around

MODEL RA-1
0.5 cu. ft. capacity

PRICE
$168.50

New, portable ROLLABRADER

Gives you all the performance of larger more costly equipment—including steel ball burnishing—PLUS light weight and bench-type operation. Has dual drive shafts with 20 to 40 rpm variable speed. Barrel easily lifts off neoprene drive-rollers. AC ¼ hp motor, ready to operate anywhere. Closed 6-sided burring barrel with orange "No-Seam" vinyl lining.

Also available in dual barrel model, total one cu. ft. capacity.

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eliminate vibration. The machine is equipped with the Cincinnati Gage-Line, an electronic device which continuously checks alignment of the centers to control taper.

Cincinnati Milling Machine Company, Cincinnati 9, Ohio.

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Portable Barrel Finishing Machines

Two models of small portable precision barrel finishing machines, "Rollabrader" Models RA and RA2, provide flexibility for individual barreling of large complex parts, for short runs of widely different pieces and for long production runs using various media.

The complete line includes three interchangeable barrel sizes of 2 quarts, 0.5 cu. ft. and 1.1 cu. ft. Barrels are simple and easy to remove from the machine by convenient lifting handles.

These units have neoprene drive rollers in direct contact with barrel flanges, dual drive shafts, safety-enclosed belt and pulleys, variable speed drive 20 to 46 rpm. A complete machine (Model RA including barrel) weighs 98 lbs. net.

Rampe Mfg. Co., Cleveland, Ohio.

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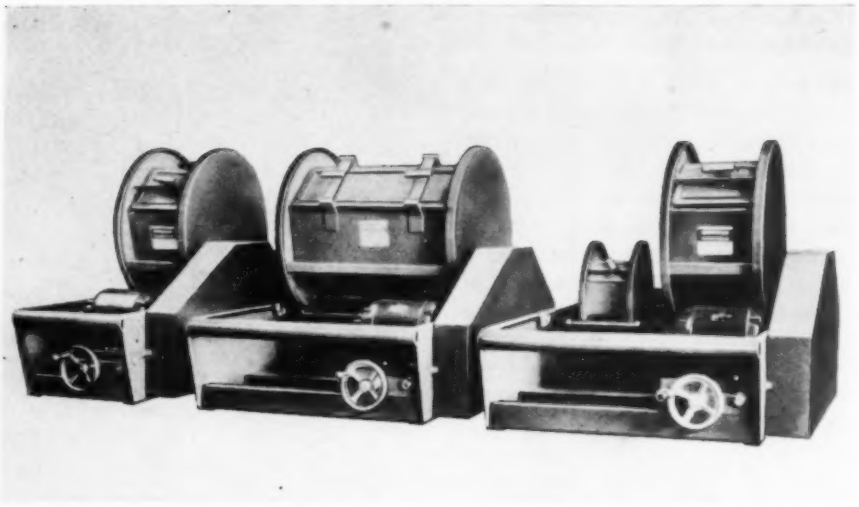

Precise Roundness, Concentricity and Squareness Gage

New concept is employed in the Cleveland Instrument Company's Indi-Ron, an instrument specifically designed for ultra-precision, out-of-round, concentricity and squareness measurements. Currently being used in research laboratories, government agencies, production floor and many industrial inspection areas, it has resulted in reduced set-up time, increased quality and decreased production costs. Controlled temperature room is not necessary for proper operation of the instrument. As a result it is possible to make measurements to an accuracy of 3 millionths or less in a few minutes for roundness of ID, OD, concentricity of ID or OD to any other ID or OD or any axis, alignment of any axis to any other axis, squareness of any face or flange to any other face, flange or axis and flatness of any face or flange.

Cleveland Instrument Co., Cleveland, Ohio.

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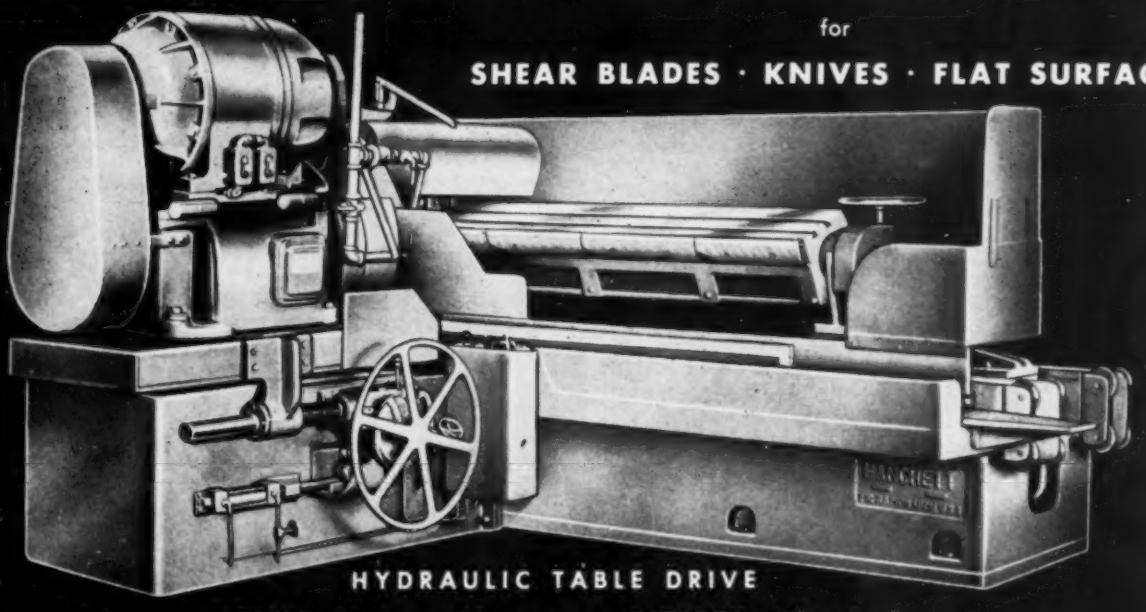

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News from the Industry

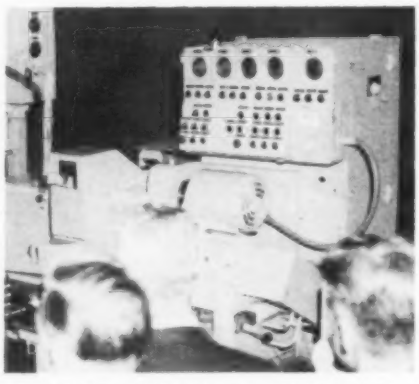
Ferris, Lewis Promoted at Pratt & Whitney

Edward J. Ferris, Jr. has been named factory manager and **Earl R. Lewis, Jr.**, production manager at Pratt & Whitney, Company, Incorporated, it was announced here today by **Edward J. Shages**, vice president of manufacturing.

In their new posts, Mr. Ferris will be responsible for coordinating all manufacturing operations and Mr. Lewis for all production department activities within the company's machine tool, cutting tool and gage divisions.

Heald Shows Grinding Machines at CMM's 75th Anniversary

Heald machines shown in action at The Cincinnati Milling Machine Company's 75th Anniversary program were as follows: A Model 090 and 0901 for grinding miniature inner and outer races, respectively; a 273A Universal Internal which performed a variety of operations; two rotary surface grinders, Models 161 and 261, surface ground sample workpieces, including gear cutters. Also featured in Heald's grinding line was a high production 190A Centri-Matic which ground straight bores of inner bearing races.



Heald Centri-Matic on exhibit at the Cincinnati 75th Anniversary. Chute-fed from a Cincinnati Microcentric grinder at the left (not shown) the machine grinds the bores of inner bearing races.

E. J. Ferris, Jr.

C. C. March

E. R. Lewis, Jr.

J. F. Whitcomb

Carborundum Joins Harbison-Walker in Subsidiary

Formation of **Harbison-Carborundum Corporation** by Harbison-Walker Refractories Co. of Pittsburgh and the Carborundum Company of Niagara Falls was recently announced by **E. A. Garber**, president of Harbison-Walker and **Gen. Clinton F. Robinson**, president of Carborundum.

The two companies will pool their resources and technology to establish the jointly-owned subsidiary for the engineering, manufacturing and sale of fused refractories. The fused refractory line of the new organization will include alumina, chromite and zirconia base refractories for the steel industry, as well as cements and other auxiliary products.

3M Executive Changes

Herbert P. Buetow, president of Minnesota Mining & Manufacturing Co., recently announced a series of executive promotions.

Joseph C. Duke has been elected to fill a new position as executive vice president for sales administration and public relations. **C. C. March**, formerly vice president for coated abrasives, succeeds Duke as group vice president for coated abrasives, adhesives and chemicals.

J. F. Whitcomb becomes general manager of the coated abrasives division.

At the same time, Buetow announced the retirement of **L. F. Weyand**, executive vice president and director of sales, and of **Arthur E. Eggert**, vice president for public relations.

A.I.T. Hosts Chicago's Carbide Engineers in "Dia-Mo-Rama" Room

Over 130 people attended the event which marked the opening of A.I.T. Diamond Tool Company's display and experimental room called the "Dia-Mo-Rama."

For this meeting, four machines and equipment were in operation to demonstrate various carbide grinding techniques. In the future, additional equipment will be added to provide a complete range of machines which use diamond wheels. The machine on hand now and the additional equipment will be available for anyone interested in trials or help in their grinding problems. Both "Electro-Assist" and "Electrolytic" units are set-up for trial or demonstration.

The meeting which took place in the beautifully appointed room began with a talk on Man-Made diamonds by N. L. Leventhal of the Metallurgical

Products Department of General Electric Co. Following this talk Skip Youman of A.I.T. moderated seven demonstrations. These demonstrations were as follows:

Surface grinding with G. E. Man-Made diamonds on a Boyar-Schultz Grinder.

Off-hand grinding carbide inserts on a Hammond SCE-6 with Electrolytic unit and also with Electro-Assist unit.

Chipbreaking on Hammond CBE-10 with Electrolytic unit and with Electro-Assist unit.

Plunge grinding on a Boyar-Schultz surface grinder.

Sharpening milling cutter on a Covel Cutter Grinder.

Anyone interested in demonstrations or clinical-type help on their diamond grinding problems is welcome at the "Dia-Mo-Rama" room. Write Skip Youman, A.I.T. Diamond Tool Co., 8221 N. Kimball Ave., Skokie, Illinois.

Pressure Blast Appoints Additional Distributors

Five additional sales organizations have been recently appointed to represent the Pressure Blast Mfg. Co., Inc. in the sale of that company's line of blast finishing equipment:

Beesley-Hoffman Machinery Co.
Buffalo, N.Y.—Central and Western N.Y.

H. E. Hofferberth Machinery Co.
Dayton, Ohio-Central and Southern Ohio, Northern Kentucky and Eastern Indiana

Riordan Machinery Co.
Detroit, Michigan-Eastern Michigan

Stanley Supply Co.
Cleveland, Ohio-Northern Ohio

Lee Hornmeyer Co.
St. Louis, Missouri-Eastern Missouri, Southern, Illinois

Industrial Sales Service, Inc.
Dallas, Texas - Texas, Okla., Arkansas, Louisiana, Western Missouri.

B. M. Smith Heads SKF's Industrial Engineering

Appointment of **Bruce M. Smith** as chief industrial engineer for SKF Industries was announced recently by **Karl Kesselring,** vice president, Manufacturing Division.

Forchheimer Moves to Trionics

Dr. Otto L. Forchheimer, formerly assistant director of research for General Abrasive Company, Niagara Falls, New York, has been named manager of the Chemistry Division, Trionics Corporation, Madison, Wisconsin.

Carborundum Changes R & D Management

Four major changes in the management of Carborundum's research and development division have been announced by **General Clifton F. Robinson,** president of the company.

Leslie E. Simon, currently vice president and director of the division, has resigned from the position, effective Dec. 1, and becomes a staff director of research and development, acting in a consulting capacity to the president.

Donald G. Sturges, now associate director, moves up to the top position.

Dr. G. M. Butler, manager of the Engineering Research Branch, has resigned and becomes head of research for a large California corporation, effective Jan. 1.

Paul N. Gillon, manager of the Basic Research Branch, becomes director of research and development for Carborundum International S. A., Geneva, Switzerland, effective Dec. 1.

Allis-Chalmers Appointments

Russell A. Hedden has been promoted to works manager of manufacturing, Industries Group, at the West Allis Works of Allis-Chalmers.

Appointment of **Harry M. Raber** as works manager of turbines, Allis-Chalmers York Works, was announced recently. Raber succeeds **Russell A. Hedden.**

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- Watch Bands
- Plastic Parts
- Watch Cases
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- Sewing Machine Parts
- Stainless Steel Pipe
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General Mills Buys Magnaflux

President **C. H. Bell** of General Mills, Inc., has announced that the company has acquired the business and assets of Magnaflux Corporation, Chicago, pioneer in the development of techniques and equipment for detecting hidden flaws in industrial materials.

Magnaflux will continue in business at its present location in Chicago and under the same name, as a wholly-owned subsidiary of General Mills.

R. A. Wilson, General Mills vice president and general manager of its Mechanical Division, is the new president of Magnaflux. **W. C. Babcock** is secretary.

Expansion Program at Simonds Worden White

F. L. Meacham, president of Simonds Worden White Company, has announced a program to expand the manufacturing facilities of its grinding wheel division.

The new facilities, expected to be completed this month, will double grinding wheel production.

The Dayton, Ohio, company manufacturers grinding wheels, shear blades and machine knives for metalworking and allied industries.

Murray-Way Adds New Distributor

The Stutz Company of Chicago has been appointed a mid-west distributor for products of **Murray-Way Corporation,** Birmingham, Michigan.

Murray-Way is a leading manufacturer of flat polishing and automatic buffing equipment, rotary filters, automatic loaders and unloaders, conveyors and special metal finishing systems.

Natural Diamond Sales Grow

The sale of diamonds from African mines during the first nine months of 1959 has exceeded sales for the entire year of 1958, according to a recent report from London.

Industrial sales from the mines for the three quarters were up 86% over the corresponding period a year ago.

During the fourth quarter, sales are expected to decline as a result of the steel strike.

New PA for Associated Spring Div.

Appointment of **Raymond C. Chenoweth** as purchasing agent for Ohio Division, Associated Spring Corporation, has been announced by **John A. Wentworth,** divisional general manager. The Ohio division is located in Dayton, Ohio.

Carborundum Re-aligns Field Sales Force

Fred W. Scott, Jr., sales manager of Carborundum's Bonded Abrasives Division, has announced a series of promotions in the field sales force, to be effective January 1, 1960:

P. R. Junod, salesman for the Buffalo area, becomes Philadelphia district manager.

E. A. Japely, San Francisco salesman, will be manager of Area "A" of the Chicago district.

M. M. Craft, field sales engineer in Los Angeles, becomes LA district manager.

F. J. Blake adds to his responsibility all company sales in Alaska and Hawaii while continuing as San Francisco district manager.

K. H. Wisby, formerly assistant district manager in Detroit, becomes manager, replacing F. C. Guest, who is retiring after 33 years service.

Norton Field Sales Changes

Changes in Norton Company's field sales organization have brought territory changes to seven men.

Richard H. Merchant, formerly abrasive engineer in the Flint, Michigan area, has been assigned to the Baltimore

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designed to collect dust from single machines

portable—easily installed

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NEW DUSTKOP AUTO SHAKER shakes filters AUTOMATICALLY

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area. **Frank W. Krohn,** formerly a field engineer in Detroit, will succeed Merchant at Flint. **George C. Crooks,** formerly a field engineer at Philadelphia, becomes the abrasive engineer for the New Orleans area. He succeeds **Homer L. Gibbs** who will now cover the Florida territory. **Robert H. Johnson,** formerly of Florida, has been reassigned to Philadelphia.

On the West Coast, **Roland L. Jandron,** formerly abrasive engineer in the Los Angeles area, is now abrasive engineer in the Seattle, Washington area. He succeeds **Arthur W. Cox,** who retired September 30. **K. Dale Swanson,** field engineer at Los Angeles since last Spring, continues in that position, but now assumes some of Jandron's former responsibilities.

Karl E. Krogstad has been appointed a sales engineer at the Philadelphia district office of Norton Company.

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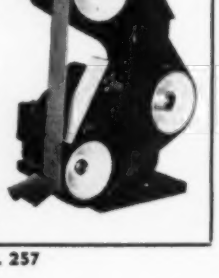

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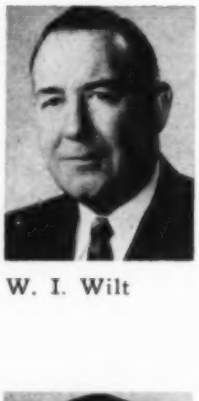
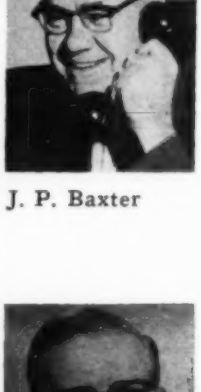
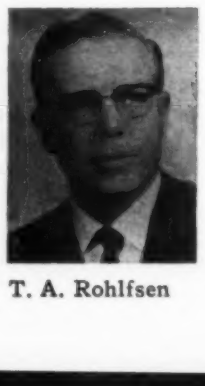


W. I. Wilt



J. P. Baxter



T. A. Rohlfsen

Albert G. Galler has been appointed an Abrasive Engineer by the Norton Co., Worcester, Mass. He will call on accounts in Northern New Jersey.

Gisholt VP Retires

H. Stanley Johnson, executive vice president of Gisholt Machine Company, Madison, Wisconsin, has recently retired after 35 years of service. He will, however, continue as a member of the Gisholt Board of Directors.

VP of Abrasive Dressing Tool

Abrasive Dressing Tool Company, Detroit, Michigan, announces the appointment of **William W. Wellborn** as vice president and director of research and product development.

Bay State Adds Philly Salesmen

Douglas N. Cook has joined the Philadelphia sales organization of Bay State Abrasive Products Company, according to an announcement by **John H. Mele,** Philadelphia district manager.

Gordon A. Lund has joined the Philadelphia sales organization of the Bay State Abrasive Products Co. of Westboro, Mass. He was previously associated for six years with the Midwest Abrasive Co. of Owosso, Mich.

Polk, Wilt Move Up at Sheffield

Louis Polk, Jr., has been appointed assistant vice president and manager of gaging and automation systems and **William I. Wilt** becomes vice president of advertising and sales promotion of The Sheffield Corporation, a subsidiary of Bendix Aviation Corporation.

The announcements were made by **C. Thorpe Thompson,** general manager of Sheffield.

Joins American Emery Wheel

The appointment of **John P. Baxter** as sales representative in Connecticut has recently been made by the American Emery Wheel Works of Providence, Rhode Island, manufacturers of a complete line of grinding wheels and abrasives.

Mr. Baxter will be associated with **Charles A. Hanlon** in America's new Bridgeport office.

Oakite Promotes Rohlfsen

T. A. Rohlfsen has been appointed manager of the South Pacific Coast division of Oakite Products, Inc., manufacturers of specialized chemical compounds for industrial cleaning and metal treating.

He succeeds **J. C. Leonard,** who is retiring after 35 years of service with the company.

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Lloyd Thorpe
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Don't Miss these Features

GRINDING and FINISHING

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Introductory section of a four-part series on standard time data and its applications in surface, cylindrical, centerless, tool and rough grinding operations.

32 Controlling Abrasive Costs

Careful study of abrasive requirements, followed by purchasing to specifications and practical inventory control, offers real opportunities for cutting grinding costs.

35 Coolant Clarifier Eliminates Scratching at Lycoming

New centrifugal coolant clarifier increases efficiency 39%, reduces costs.

38 Finishes Without Removing Metal

Flap-type drum wheel performs a "surface phenomenon" in finishing copper-clad laminates at Mica Corporation.

42 Infeed Control for Centerless Grinding

Solving the many problems involved in infeed rate on centerless grinding has brought increased precision, reduced scrap on this high-volume method of grinding.

Coming Next Month

The State of the Industry

What were the big developments of 1959 in the grinding and finishing industry? What's ahead for 1960? How will 1960 sales stack up against 1959? These and other questions of importance to all users of abrasives are the "meat" of this article, recorded in the comments of the industry's leaders. As one reader commented on the 1959 "State of the Industry," this is like sitting in on a bull session with the best-informed men in the business.

Detroit Broach Eliminates Burning, Loading with Wheel Treatment

In the highly competitive field of tool manufacturing every machining operation requires close scrutiny. The application of a wheel treatment resulted in eliminating burning and loading while saving man hours and wheel life for Detroit Broach.

Flat Polishing . . . Cost Saver in Finishing

When metal finishing and polishing costs can be cut from $64.00 per 1000 square feet to a little over $10.00 the process should be considered for most applications. Thought of mostly in relation to large volume manufacturers, flat polishing is now within reach of all.

Right-Size Wheels Cut Grinding Costs

Bench-marks to aid you in getting more for your grinding wheel dollars—and using more of the abrasive you buy. Within the limits of the Safety Code, there is room to vary both the size and shape of wheels you use, to your advantage.

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The Meeting Will Come to Order

Look you at the committee members! This one writes his name in fancy script on the pad, that one doodles leaning pagodas, the other gnaws his pencil like a beaver, one strains to read the Organization Chart on the far wall, another—with hands folded over kingly girth —dreams of sugar plums and fairy queens. Are committees composed of such as these? What ghastly fate for any High Adventure and Great Undertaking.

For it is so with committees, as it is with any group of humans: thinking and ability seek a common level, and the common denominator of any group is below the average intelligence of the group. The brilliant is spurned, the thinker is scorned and the mediocre comes into his glory.

Committees do not raise high towers, span the oceans with cable or hammer-out empires. How ridiculous this sounds: Mr. Bell and his committee; Mr. Columbus and his committee; Mr. Carnegie and his committee. No, indeed, Group Thinking has produced very little of permanent value or advanced mankind many steps.

You might well raise an eyebrow over my concern with committees and say, they are not inconsequential, not all weak clay. And I will agree with you. Committees have their place as fact-finding bodies, as implementing groups, but I do decry their use as creative planning groups, as initiators. I do censure the philosophy which permits committees to sit in judgment on the bold schemes of leaders. I am afraid that all of us are becoming committee-happy and are replacing brilliant individual thinking with low-level group mumbling. Leaders have always been scarce and, as Cicero said many years ago, are becoming scarcer. Then why muzzle those we have with a committee?

Leadership does not mean at the high national level only, but at every plateau of national and industrial life. It happens so often, whenever the guiding head of either a small or large undertaking lacks dynamic leadership qualities he forms a committee, or a planning group and thus hopes (alas, in vain) that the group, because it is many-headed, will supply that creative thinking which is his want. And this a committee can never do because its common denominator is always mediocrity and never inspiration.

I believe in some types of committees, but I believe in the individualist more—in dynamic leadership and venturesome spirit, in the daring of a hero even with all his conceits, idiosyncrasies, his whims and his star gazing.

Because we cannot all be leaders and combat conventions with audacious imaginings, at least let us not squat in committee and with steel bands strap down with petty notions the leaders we have.

Wm. J. Schleicher

Vice President & Editorial Director

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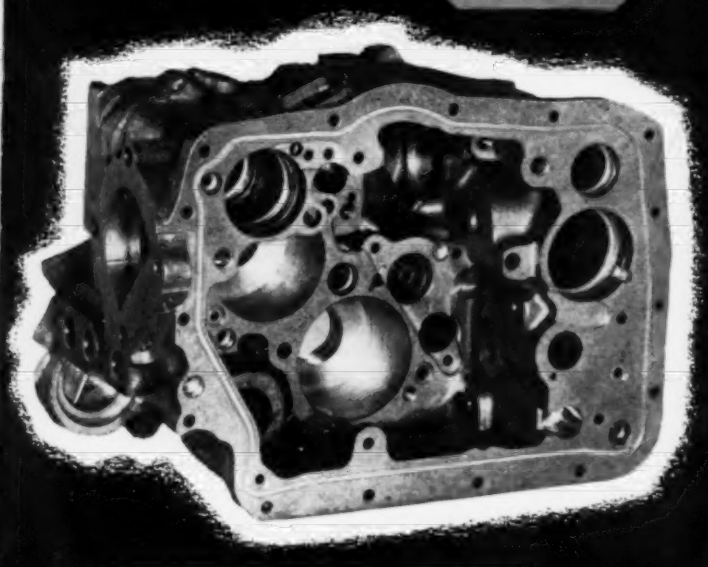

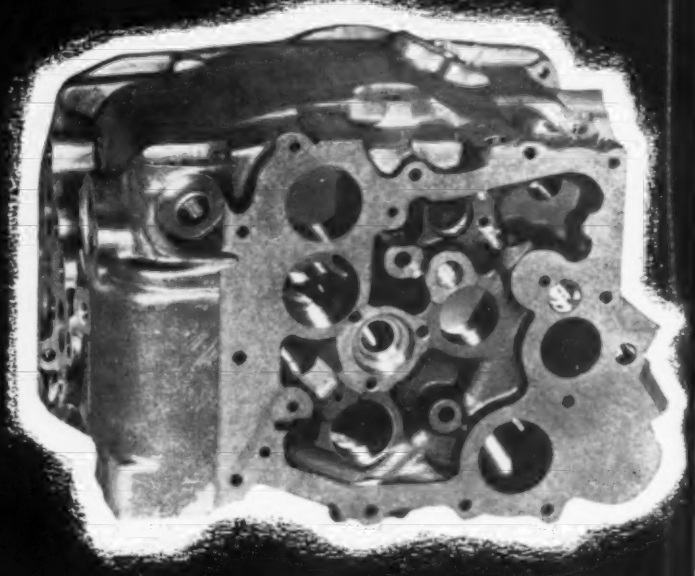

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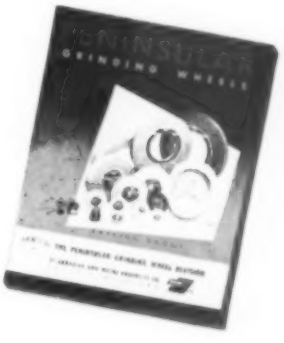

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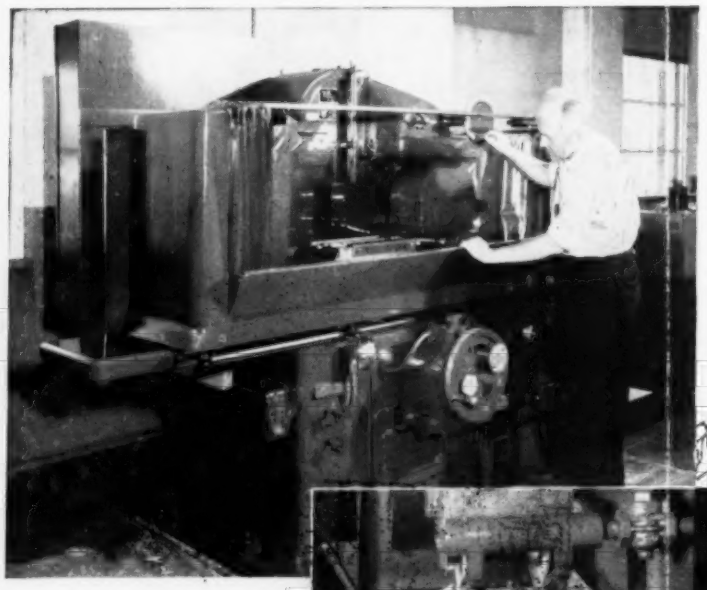

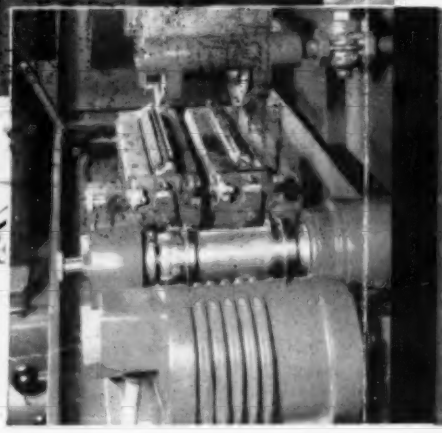

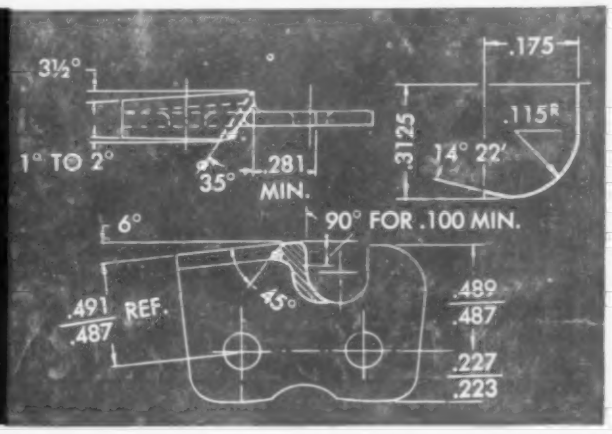

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